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GEOPHYSICAL ABSTRACTS 120

JANUARY - MARCH 1945

COMPILED BY

W. AYVAZOGLOU AND V. SKITSKY

I.C. 7324,
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UNITED STATES DEPARTMENT OF THE INTERIOR - BUREAU OF MINES

GEOPHYSICAL ABSTRACTS 120
January - March 1945[1]

Compiled by W. Ayvazoglou[2] and V. Skitsky[2]

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FOREWORD

Geophysical Abstracts 1 - 86 were issued in mimeographed form by the Bureau of Mines; Abstracts 87 - 111 were published in bulletins of the Geological Survey; Abstracts 112 - 119 were issued in mimeographed form by the Bureau of Mines as Information Circulars 7256, 7257, 7267, 7273, 7285, 7292, 7303, and 7310.

1. GRAVITATIONAL METHODS

7786. Barton, D. C.[3] Case Histories and Quantitative Calculations in Gravimetric Prospecting. Am. Inst. Min. and Met. Eng., New York, Tech. Pub. 1760, 1944, 49 pp.

Four papers compose this publication: (1) Gravity anomalies of Nash and Damon Mounds, Fort Bend and Brazoria Counties, Tex.; (2) Lost Hills, Calif. - an anticlinal minimum; (3) Gravity minimum at Tepetate on very deep salt dome, Acadia Parish, La.; and (4) Quantitative calculations of geologic structure from gravimetric data. The first three papers are case histories of individual geophysical prospects subsequently tested by drilling. They deal with local geology, methods of gravitational surveying, specific-gravity relations, anomalies, maxima-minima, special local features, and interpretation. The fourth paper presents several calculations of the subterranean mass causing an observed anomaly. The instances considered are determinations with regard to the cap of salt domes, the salt core, and the position of the crest of a structure. In an introduction to the publication, Paul Weaver stresses the author's contributions to a quantitative approach in exploration problems. Numerous maps, profiles, and tables illustrate the four papers. - V. S.

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[1] The Bureau of Mines will welcome reprinting of this paper, provided the following footnote acknowledgement is used: "Reprinted from Bureau of Mines Information Circular 7324."

[2] Physical science analytical editor, Bureau of Mines, U. S. Department of the Interior.

[3] Prepared for publication by Paul Weaver, after death of author.

7787. Boaga, Giovanni. Su un programma di ricerche geofisiche in Toscana per l'individuazione di giacimenti metalliferi (Concerning a Program of Geophysical Investigation in Toscana for Finding Metal Ore Deposits). Geofis. pura appl., Messina, vol. 2, 1940, pp. 153-158.

The advisability of using gravitational measurements for determining the location of metal ore deposits in Toscana, Italy, is considered. The Bottino region is favored above others. The discussion is based on the geological characteristics of Toscana. The physical properties of certain ores are also taken into account. Particular attention is devoted to lead, zinc, and antimony. - V. S.

7788. Brant, A. A. Gravimetric and Magnetic Geophysical Surveys in the Gas Fields of Southwestern Ontario, 1941 and 1942. 52d Annual Report of the Ontario Department of Mines, vol. 52, part 5, 1943, Toronto, 1945, pp. 73-88.

A gravimetric survey was made in southwestern Ontario by several gas companies before 1941. The data obtained were amplified further by a vertical-intensity magnetic survey conducted by the author in the same areas in 1941-42. The rock's specific gravities and magnetic susceptibilities were also measured, to determine the nature of observed anomalies. This combined material is analyzed, with presentation of contour maps, profiles, and other data. Conclusions are reached on the causes of anomalies and the structure of the basement. In their light, three parts are distinguished with regard to gas in the area surveyed: (1) The productive Malahide, Brownsville, Middleton, and Port Burwell areas, where the fields are grouped on the steep flanks of a deep syncline; (2) the barren area north, northwest, and west of this, which is situated on a high, apparently rigid plateau of the basement; and (3) the Essex-Kent-Lambton area, where the Paleozoic structural forces have been much greater than elsewhere and the basement has yielded. - V. S.

7789. Goudey, Raoul. Mesures de l'intensité de la pesanteur en France pendant l'année 1941; 2-e série (Measurements of the Intensity of Gravity in France During the Year 1941; 2d ser.). Compt. rend. Acad. Sci., Paris, vol. 215, 1942, pp. 458-459.

Gravity measurements were made in the east of Montauban and the north-est of Albi during September and October 1941. This region contains the ome of Grésigne. The Holweck-Lejay pendulum instruments were used. The ata are tabulated. - V. S.

790. Graf, Anton. Ein neuer kleiner Schweremesser (A New Small Gravimeter). Beitr. angew. Geophys., Leipzig, vol. 10, 1942, pp. 18-34.

The former model of the gravimeter of Askania-Werke, Berlin, has been eveloped into a new and lighter instrument. The entire equipment weighs ow about 30 kg. Its precision exceeds 0.1 mgal. Transportation can be ade by means of any vehicle or carrier. - V. S.

791. Haalck, H. Welche gravimetrischen Bestimmungsstücke ergeben durch die Darstellung ihrer örtlichen Verteilung das deutlichste Bild von den die Schwerestörung verursachenden Dichteungleichheiten im Untergrund? (What Means of Gravimetric Determination Show, Through a Presentation of the Local Distribution, the Clearest Picture of the Differences of Underground Density Causing the Gravity Anomaly?). Beitr. angw. Geophys., Leipzig, vol. 10, 1943, pp. 130-146.

A comparison is made between the first three vertical derivatives of he gravity potential, given in terms of isanomalies, and the customary epresentation of torsion-balance measurements by means of gradient arrows nd curvature-value lines. The vertical derivatives in question are: ravity acceleration W_z, and the vertical gravity gradients W_{zz} and W_{zzz}. The comparison shows that these derivatives give a better insight into nderground conditions than the gradient arrows and curvature values. Among the derivatives, the vertical gradient W_{zz} has the smallest precision. As regards the reference of the derivatives in depth, W_{zzz} gives, above ll, information concerning superficially disposed differences of density; W_{zz}, about difference at intermediate depths; and W_z, about deeplying ensities. - V. S.

7792. Kawabata, J. Seismic or Volcanic Zone and the Deflection of the Vertical. Jour. Meteorol. Soc. Jap., Tokyo, vol. 17, 1939, pp. 320-325.

In this preliminary note the writer suggests the fact that the deflection of the vertical, referred to the reference ellipsoid which approximately represents the geoid surface in the regions concerned, is not only very large in its absolute values but also very systematic and regular in direction in the districts where the seismic or volcanic activity is violent. - Author's abs.

7793. Kogbetliantz, E. G. Quantitative Interpretation of Magnetic and Gravitational Anomalies. Geophysics, Menasha, Wis., vol. 9, No. 4, 1944. pp. 463-493.

A new interpretation method for gravitational and magnetic anomalies based on the use of average values (integrals) of suitably chosen functions of the observed quantity is discussed and illustrated by application to the particular case of a symmetric anticline. The quantitative interpretation yields the position of the apex, the slope of the sides, the thickness, the depth of the base of the anticline, as well as the density contrast for the gravitational case and the magnitude and direction of the magnetization vector for the magnetic case. - Author's abs.

7794. Prey, A. Bemerkungen zu Preys Reduktion der Schweremessungen (Remarks Regarding Prey's Reduction of Gravity Measurements). Gerlands Beitr. Geophys., Leipzig, vol. 56, 1940, pp. 223-225.

Prey's reduction of the values of gravity measurements is briefly explained. It consists in referring the observation point to the geoid, while leaving the distribution of masses unchanged. Next, the application of free-air anomalies to the calculation of geoid undulations is critically examined. Theoretical objections arising because of dislocations of the geoid are indicated. The practical usefulness of free-air anomalies is demonstrated by the formula derived by means of spherical functions by the author and H. Jeffreys. In turn, the application of Prey's reduction to the calculation of geoid undulations is discussed. The small extent of undulations in this case is explained. Finally, the concept of niveau-spheroids is shown to be open to objections. - V. S.

7795. Razdymakha, G. S. An Experimental Model of a Gravimeter with Minimum Quartz Pendulums Constructed by TsNIIGAiK (in Russian). Tsentral'nyi Nauchno-Issledovatel'skii Institut Geodezii, Aeros'emki i Kartografii GUGK pri SNK SSSR, Sbornik 7, Issledovaniia po Gravimetrii, Moscow, 1941, pp. 49-81.

The general gravimetric survey of the U.S.S.R. requires instruments of high precision. Accordingly, the Central Scientific Research Institute of Geodesy, Aerial Survey, and Cartography (TsNIIGAiK) has endeavored to develop a field pendulum-gravimeter that would meet the strictest requirements. The experimental model is described and illustrated by drawings. "Minimum" pendulums of a half-second cylindrical type were used; they are generally regarded as superior to those of Sterneck-Stückrat. These pendulums were made of fused quartz which has a more stable molecular structure than other material. Each pendulum consisted of only two parts, the body and the knife. Special arrangements insured setting the pendulums in identical positions on the supporting surfaces. The pendulums and related parts were contained in a vacuum, within a copper cover. When they were not in use, a lock held them in a fixed position. Two principal problems are involved in the construction of this apparatus: The advantages and limitations of minimum pendulums and the dependence of the period of pendulum oscillations on the shapes of the knife edge and supporting surface. These problems are treated mathematically. The model was tested, and the results are presented. The oscillation stability of quartz pendulums is considered to be demonstrated. - V. S.

7796. Roever, W. H. The Weight Field of Force of the Earth. Washington University Studies - New Series, Science and Technology - No. 11, St. Louis, 1940, 84 pp. Price, $1.50.

The gravitational field of force differs from the weight field of force in that the former is referred to axes fixed in the earth whereas the latter is referred to an absolute inertial system. The gravitational force must be augmented by the centrifugal force due to the rotation of the earth in the stellar system, to produce the weight force. For a body in motion with respect to the earth, considered in stellar space, other accelerations enter, causing a compound centrifugal force, evidenced in many unusual phenomena observed only when great precision of observations is attained. For example, in the Northern Hemisphere, a projectile deviates to the right and cyclones rotate counterclockwise; in both hemispheres the Foucault pendulum oscillates in a plane which rotates with reference to the earth.

The geoid, defined as the surface of a calm ocean interlinked with water-level canals, approximates an ellipsoid whose oblateness is due about equally to rotation and mass distribution. Locally, this geoid is also affected by mountains or depressions; and the deviation of the geoid, or a level surface, from a spherical form is measured by the extreme curvatures of the level surface at the point. Hence it is futile to seek a mathematical expression for the potential function of the weight field of the entire earth.

By chapters, a mathematical discussion is given of: (1) Laws of relative motion, both as to velocity and as to acceleration. (2) Velocity and retardation in an atmosphere. (3) A localized particle of negligibly small mass on an earth rotating in the stellar system. (4) Tides, precession and nutation. (5) Geodetic problems: potential functions of the weight field, weight field at rest with respect to the solid earth, curvatures of the lines of force and torques acting on the Eötvös torsion balance. (6) Reduction to coordinate analysis of preceding chapter. (7) The differential equations of the motion of a projectile with solution for lack of air resistance and simplified potential function. Solutions are given for the time of flight, range and drift, in general and in terms of initial velocity and direction. The method of differential corrections is summarized. (8) Path of a baseball and surface of a liquid on a turning table: the simple conical pendulum.

Because of its mathematical nature and the concise and precise style, the original paper should be consulted for details. - I. Roman.

7797. Ruedemann, Rudolf. The Hudson Valley Belt of Graptolite Shales and Negative Anomalies of Gravity. Am. Jour. Science, New Haven, Conn., vol. 242, No. 7, 1944, pp. 391-396.

In reference to Longwell's paper on the Geologic Interpretation of Gravity Anomalies in the Southern New England-Hudson Valley Region the writer points to the great thickness of the graptolite shales reached and the great depth of the geosyncline indicated by the radiolarian fauna and suggests that the Levis trough with the graptolite beds may have been the central portion of a mediterranean sea, the shallow littoral portion of which was formed by the adjoining so-called Chazy and eastern troughs. The great thicknesses of the westerly adjoining Schenectady and Canajoharie beds are considered as partly explained by the northwest swing of the negative isanomalies in the Mohawk Valley and partly as a secondary effect of the strong sedimentation in the adjoining geosyncline. - Author's abs.

7798. Thyssen, S. von. Über die mögliche Beeinflussbarkeit der Drehwaage durch Grundwasserschwankungen (Concerning the Possible Influence of Ground-water Shifts on the Torsion Balance). Ztschr. Geophys., Braunschweig, vol. 17, 1942, pp. 279-281.

A varying distribution of ground waters can affect torsion-balance measurements. Several examples are given to show that under certain conditions shifting ground waters have so markedly influenced gravity gradients and curvature values as to render their validity doubtful. Accordingly, the interpretation of torsion-balance measurements should take into account the condition of ground waters. - V. S.

7799. Vening Meinesz, F. A. Gravimetrical Observations at Sea: Theory and Practice (in Russian). Izdatel'stvo Geodezicheskoi i Kartograficheskoi Literatury G.U.G.K. pri S.N.K. S.S.S.R., Moscow, 1940, 324 pp.

In this book are collected Russian translations of the author's papers on gravimetric measurements at sea: (1) The theory and practice of pendulum observations at sea, Delft, 1929; (2) Gravity expeditions at sea, 1923-30, Delft, 1932; and (3) Gravity expeditions at sea, 1923-32; with the collaboration of J. H. F. Umbgrove and P. H. Kuenen; Delft, 1934 (see Geophys. Abs. 57, No. 1756; and Geophys. Abs. 75, No. 2613). In an appendix are added translations of papers: (1) B. Brown: Measurement of the force of gravity at sea; (2) F. A. Vening-Meinesz: The disturbing member of 2d order in pendulum observations at sea; and (3) F. A. Vening Meinesz: The disturbing member of 2d order (corrective member of Brown) in pendulum observations at sea. The text includes gravimetric profiles and maps. The book contains an introduction by Prof. P. M. Gorshkov, editor. - V. S.

7800. Weiss, Oscar. Report on the Geophysical Survey at Inhaminga. Incorporated in: Putnam, L. G., and Weiss, Oscar, Geological and Geophysical Report on the Inhaminga Structure Near Inhaminga, Portuguese East Africa, May 1935 (deposited in typewritten form in the Geological Survey library, Washington, D. C.)

The author has made gravimetric and seismic surveys in the Inhaminga (Inyaminga) area in 1934 and 1935. This area lies in Portuguese East Africa about midway between Beira and the Zambesi River. The problem was to determine the highest part of a supposed anticline in the Inhaminga geological structure and to find suitable sites for drilling. The gravimetric survey was carried out with the Jones-Shaw gradiometer measuring

e horizontal gravity gradients; the seismic survey, with Jones' microid
ismographs. The work is described. The results showed that no anticline
ists and that the geological structure in question is a part of a large
d dipping block terminated by a broad fault zone. These findings have
d the author to caution against exaggerated expectations of oil and to
vise the drilling of one deep borehole. (See also abs. 7897 in this
sue). - V. S.

2. MAGNETIC METHODS

01. Berstein, I. Sur un phénomène d'induction dû à l'interaction de champs magnétiques perpendiculaires (Concerning an Induction Phenomenon due to the Interaction between Perpendicular Magnetic Fields). Compt. rend. (Doklady) Acad. Sci. U.R.S.S., Moscow, vol. 43, No. 9, 1944, pp. 380-382.

A new-type magnetometer has been developed by the author. It is based
an induction phenomenon observed in perpendicular magnetic fields. The
gnetometer consists of a rectilinear ferromagnetic wire stretched across
coil and placed in a constant magnetic field. The direction of the wire
perpendicular to the coil's winding but parallels the magnetic field.
such an arrangement, an alternating current passed through the wire
nerates an alternating electromotive force in the coil. This would not
the case if the relationship between the induction and the field in the
re was linear, because the flux passing through the coil would not vary.
ternation results from a nonlinear interaction between two perpendicular
gnetic fields; namely, the variations of the transverse component of the
eld generated by the electric current produce variations in the longi-
dinal component of the induction created by the constant longitudinal
eld. A mathematical theory is developed in explanation. It is based
the assumptions that the magnetic properties of the wire are identical
all directions and that hysteresis can be ignored; the wire is supposed
be isotropic. The magnetometer is called the "Oerstedmeter". - V. S.

802. Bossolasco, Mario. La distribuzione del campo magnetico terrestre all'isola di Stromboli (The Distribution of the Earth's Magnetic Field on the Island of Stromboli). Geofisica Pura e Applicata, Messina, vol. 5, 1943, p. 11.

A report is presented on magnetic measurements made on the island of
tromboli during 1940. Vertical and horizontal components were determined
t 218 stations. This survey revealed exceptionally strong anomalies ex-
ceeding 5,000 gammas at times. They are attributed to past and recent
olcanic activity. - V. S.

rant, A. A. Gravimetric and Magnetic Geophysical Surveys in the Gas Fields of Southwestern Ontario, 1941 and 1942. 52d Annual Report of the Ontario Department of Mines, vol. 52, pt. 5, 1943, Toronto, 1945, pp. 73-88 (see abs. 7788 in this issue).

7803. Davids, Norman. Calculation of Vertical Component (Z) for Potential Fields from Observed Values of Declination (D) and Horizontal Intensity (H). Terrestrial Magnetism and Atmospheric Electricity, Baltimore, Md., vol. 49, No. 4, 1944, pp. 239-242.

The author considers a magnetic vector field derivable from a scalar potential; the part of the field originating from sources inside the earth is supposed to be known. In such a case the values of the three components D, H, Z are not independent. There exists a functional operator by means of which any one of the functions can be calculated from the other two. Since in practice D and H are usually determined with much greater accuracy than Z, knowledge of this operator would make it possible to compute Z from D and H in uncertain regions. The author presents the derivation of a formula for the operator and gives a trial computation of Z for an eccentric-dipole field. - V. S.

7804. Fleming, J. A. Summary of the Year's Work, to June 30, 1944, Department of Terrestrial Magnetism, Carnegie Institution of Washington. Terrestrial Magnetism and Atmospheric Electricity, Baltimore, Md., vol. 49, No. 4, 1944, pp. 245-250.

During the year July 1, 1943, to June 30, 1944, practically the entire staff of the department continued to work on war problems. Still, geomagnetic progress was good because much of such research could be made with the theoretical and instrumental material accumulated in previous years. The reported activities are reviewed under the following headings: (1) Geomagnetic investigations, (2) terrestrial electricity, (3) ionosphere, (4) nuclear physics, (5) observatory and field work, and (6) publications. - V. S.

7805. Fleming, J. A., and Scott, W. E. List of Geomagnetic Observatories and Thesaurus of Values, VI-VII. Terrestrial Magnetism and Atmospheric Electricity, Baltimore, Md., vol. 49, Nos. 3-4, 1944, pp. 199-205, 267-269.

Table 1, Annual Values of Geomagnetic Elements at Observatories, is continued. Comments are added in pt. VI on the improvement of recording and the reduction of data at magnetic observatories. - V. S.

7806. Galbraith, F. M. The Magnetometer as a Geological Instrument at Sudbury. Amer. Inst. Min. Met. Eng., New York, Tech. Pub. 1482, 1942, 6 pp.

This paper describes the use of the magnetometer, under geological direction, in exploration of the Sudbury nickel district. The writer's experience at Falconbridge has led him to the belief that only through detailed work, and by careful correlation of both geological and geophysical results, can geophysical prospecting methods be applied successfully to mining exploration problems. It is hoped that the basic technique described in the paper will be found to have general application. - Author's abs.

807. Halet, R. A. Malartic Mine Was Found by Scientific Exploration. Eng. and Min. Jour., New York, vol. 145, No. 6, 1944, pp. 88-91.

The Malartic gold ore body is buried deeply beneath a heavy clay overurden in northwestern Quebec. Its discovery was difficult because less han 5 percent of the bedrock outcrops in this region. Prospecting started n 1925 and detected an ore body, but work was discontinued because the ore eemed unprofitable. In 1934 a magnetometer survey was made east of the revious discovery. It located an ore-bearing formation which was obtained y diamond drills in 1936. This ore has been exploited by the East alartic Mines, Ltd., and the Malartic Gold Fields, Ltd. To the end of 942 the mine has produced over $5,000,000 in gold. The geology of the rea is described. - V. S.

808. Hirayama, M. On the Diurnal Variation of the Earth's Magnetic Field (in Japanese, with an English summary). Journ. Meteorol. Soc. Japan, Tokyo, vol. 17, 1939, pp. 55-56, 118-140.

The magnetic field caused by the oscillation of the atmosphere is alculated from fundamental equations; the results obtained on the electroagnetic field in the ionized layer are taken into consideration. As a esult, it is shown that, when the oscillation is similar to that observed t the earth's surface and the numbers of electrons and ions are not much ifferent, the current in the layer of a mean height about 110 km. gives he observed amplitudes of the magnetic field fairly well. In a layer ith large conductivity, the magnetic field can be considered to change ith the same period as the oscillation, because the variations with other eriods are negligibly small. - Y. Kodaira, Ztrbl. Geophys. Meteorol. eodäs., vol. 5, 1940, p. 19.; condensed by V. S.

809. Johnson, M. E. Prospecting for Iron Ore in New Jersey in 1943. Skillings' Mining Review, Duluth, Minn., vol. 33, No. 20, 1944, pp. 1-2.

Numerous dip-needle surveys of iron ore have been made in New Jersey uring 1943. Most prospects were disappointing. Some favorable indiations were found in Morris County. The work showed a need of fairly etailed magnetic surveying before core drilling because the general nformation is seldom sufficient or reliable for selecting drilling sites. V. S.

810. Johnston, H. F. Mean K-Indices from Twenty-Seven Magnetic Observatories and Preliminary International Character-Figures for 1943. Terrestrial Magnetism and Atmospheric Electricity, Baltimore, Md., vol. 49, No. 4, 1944, pp. 255-260.

Tables are given with explanatory text. - V. S.

Kogbetliantz, E. G. Quantitative Interpretation of Magnetic and Gravitational Anomalies. Geophysics, Menasha, Wis., vol. 9, No. 4, 1944, pp. 463-493 (see abs. 7793 of this issue).

7811. Maurain, Charles, and Coulomb, Jean. Sur les perturbations magnétiques en baie (On Magnetic Disturbances Recorded in the Form of Loops). Compt. rend. Acad. Sci., Paris, vol. 216, Nos. 9-10, 1943, pp. 273-276, 327-329.

A statistical study has been made of magnetic disturbances forming loops on the curves of recording apparatus. These disturbances were studied previously by several authors. The present investigation is based on observations made near Paris during 1883 to 1941. The large volume of data made it possible to select only typical cases and yet to employ statistical methods. Three categories of disturbances were distinguished in the chosen material: (1) PB.1, duration less than 15 min.; (2) PB.2, duration between 15 and 30 min.; and (3) PB.3, duration longer than 30 min. In the analysis, PB.2 proved to be insignificant and were discarded. The results for PB.1 and PB.3 showed that these categories possess different statistical properties and are probably due to different types of sun radiations. The present paper deals with the diurnal and annual distributions of the magnetic disturbances classed in category PB.3. The correspondence between this category and sun declination is analyzed. - V. S.

7812. Ol, A. J. Solar Activity and Geomagnetic Perturbations (in Russian). Bull. (Izvestiia) Acad. Sci. U.R.S.S., Moscow, Sér. Geogr. Geophys., No. 6, 1943, pp. 359-374.

In 1937-41 there was developed a statistical approach to the theory of the impulse character of solar activity. This approach has been used by the Pulkovo Observatory in its investigations of the relationship between solar activity and geomagnetic disturbances. Some preliminary results are presented. It is found that the geomagnetic field is affected mainly by the distant positive phases of solar impulses, and less so by their zero phases. This observation can serve for forecasting magnetic disturbances. Other results are given. - V. S.

7813. Procopiu, St. Mesures magnétiques en Roumanie, en 1938: La déclinaison magnétique et la composante horizontale. (Magnetic Measurements in Rumania in 1938: Magnetic Declination and the Horizontal Component.) Compt. rend. Acad. Sci. Roumanie, Boucharest, vol. 3, 1939, pp. 284-292.

An absolute determination of elements of the terrestrial magnetic field was made in Rumania in the summer of 1938. 20 stations were established in different provinces. The author measured declination and the horizontal intensity. The data are tabulated. They show that the magnetic declination has everywhere eastern values; these lie within the limits of 0°20' in Wallachia, and within 1° 48' in Dobruja. The horizontal intensity attains its highest value of 0.25398 CGS in Cavarna, Dobruja, and its lowest value of 0.21739 CGS in Bîrlad, Moldavia. The presentation of data is accompanied by geological observations. - V. S.

7814. Pushkov, N. W. Geophysical Work in the Union of Soviet Socialist Republics. Terrestrial Magnetism and Atmospheric Electricity, Baltimore, Md., vol. 49, No. 4, 1944, pp. 276-277.

A brief letter summarizes geomagnetic work in the U.S.S.R. The Institute of Terrestrial Magnetism was founded in 1940. Gradually, the following sections were established: survey on land, survey at sea, superintendence of magnetic observatories, cartography, ionosphere station, theoretical investigations, and some others. Before the war, the institute took measures to establish magnetic standards, compare the instruments of observatories, forecast magnetic disturbances, etc.; surveys were chiefly conducted in the western part of the country. During the war, the sections of the institute were moved to the observatory at Vysokaia Dubrave near Sverdlovsk. Regular observations were continued, new types of instruments were constructed, preparations were carried out for spectroheliographic and cosmic-ray-intensity work, several expeditions were sent to study magnetic anomalies connected with mineral deposits, etc. At present, the institute conducts the magnetic and ionospheric services of the U.S.S.R. - V. S.

7815. Rougerie, Paul. Sur la direction de l'aimantation terrestre (on the Direction of Terrestrial Magnetization). Compt. rend. Acad. Sci., Paris, vol. 216, No. 13, 1943, pp. 451-452.

J. Coulomb has previously shown that the position of an apparent north pole P_m of a uniform terrestrial magnetization reproducing the observed field can be determined by means of the data of a single magnetic station. The author now calculates the geographical coordinates of the boreal pole P_m for each of 65 stations operated during the International Polar Year 1932-33. This calculation reveals a certain dispersion of the computed poles. In the dispersion six groupings can be distinguished, with average geographical positions corresponding to Europe, continental Asia, China and Japan, North America, South America, and Australia. A seventh group comprises poles corresponding to magnetic stations of high latitudes. An examination of these groupings discloses that the inclination of the magnetic axis to the rotation axis of the earth varies from one continent to another; the angles of inclination are given. Futhermore, in the Northern Hemisphere, projection of the magnetic axis on the equatorial plane moves from the west to the east as the latitude of stations diminishes. In the Southern Hemisphere, no such movement is observed and the projection seems to be stable. - V. S.

7816. Schwinner, Robert. Was kann die remanente Magnetisierung von Bohrkernen bedeuten? (What Can the Residual Magnetization of Borehole Cores Mean?). Ztschr. deutsch. geol. Gesell., Berlin, vol. 94, 1942, pp. 324-326.

H. Reich has shown that the residual magnetism of borehole cores can be very considerable and is, moreover, subject to large variations. This observation would render magnetic measurements in boreholes very uncertain. In objecting to Reich, the author points out that the residual magnetism in question can result from the process of boring. The cores may be heated thereby up to and beyond the Curie point. Such a temperature would change not only the magnetic properties but also the structure of rocks. The subsequent cooling would produce in the cores a magnetization of their own. This magnetism would be affected not only by the magnetic field of the surrounding ground but also by that of the borehole equipment. The author thinks these considerations refute Reich's viewpoint. - V. S.

7817. Spiroff, Kiril. Dip-Needle Survey of Wyandotte-Winona Area, Houghton County, and Cherokee Area, Ontonagon County. Michigan Dept. Conserv., Prog. Rept. 7, 1941, 17 pp.

The dip-needle survey has established that belts of rock, both flows and conglomerates which elsewhere have produced the greatest amounts of copper, cross the Cherokee area, and their positions are located. These important zones have not been explored by the drill or by shaft, but it is believed they represent favorable ground for future prospecting. To emphasize this point, a diagrammatic cross section of the Keweenawan series has been prepared. It shows the zones of rock in which the great copper lodes are localized from place to place, and the relative value of copper produced from each. The large map accompanying this report shows the key-horizon markers of the Keweenawan series from the Keweenaw fault to the outer conglomerate, and also sites of exploration and certain physiographic features. - Ann. Bibl. Econ. Geol. 1942, vol. 15, No. 2, 1943, p. 264.

7819. Thyer, R. F. Report on the Geophysical Surveys at the Wallaroo-Moonta Copper Field. South Australia Department of Mines, Mining Review, Adelaide, No. 77, 1942, pp. 41-48.

Electrical, magnetic and electromagnetic surveys were conducted over certain areas of the Wallaroo-Moonta copper field, South Australia. (1) The electromagnetic survey proved to be the most effective and was used extensively. The method employed is described. The results showed the existence of a large number of electrically conductive zones of varying degrees of conductivity. A comparison of their effects with the effects obtained over known lode shears has lead to the conclusion that the majority of the observed zones are likewise lode shears. Therefore, a drilling program was outlined. (2) The magnetic survey indicated very strong anomalies in the vicinity of the Devon mine. Vertical magnetic intensities rose to over 6,000 gammas above the normal values for the area. These anomalies are mapped and described. No conclusions were possible from the limited magnetic data so far obtained. - V. S.

7820. Zapffe, Carl. Memorandum Report on Iron Ores of the Cle Elum District, Washington. State of Washington, Division of Mines and Mining, Report of Investigations 5, Olympia, 1944, 27 pp.

The exposed iron ore of the Cle Elum district, Washington, was studied in a limited area with a view to determining the best portions of the deposit. The investigation included a magnetic survey. (1) At first, dip-needle readings were taken across known ore formations. The results agreed with the author's past experience for similar strike and dip. The maximum reading occurred at the middle, or a little to the east of the middle, of the ore formation. Where the strike was about N. 30° E., the readings to the west (on the sandstone) of the maximum attraction were positive, whereas those to the east (on the peridotite) were negative. Where the strike was N.S. and the dip westward, the readings both to the east and west showed a drop to negative values and produced a profile almost symmetrical about the point of maximum attraction. (2) After this preparatory work, dip-needle readings were made across a nearby unknown area. The profiles showed a magnetic belt containing maxima of moderate intensity. The plotting gave gently sloping curves. In the light of previous observations, the entire configuration suggested the presence of a continuous band of ore formation. - V. S.

3. SEISMIC METHODS

7821. American Society of Civil Engineers. Seismological Definitions and Nomenclature. Bull. Seismol. Soc. America, Berkeley, Calif., vol. 34, No. 4, 1944, pp. 217-228.

The American Society of Civil Engineers authorized in 1940 a Committee on Seismology. This committee in turn set up a Subcommittee on Definitions and Nomenclature for standardizing terminology in publications. The subcommittee now publishes a preliminary report for critical examination by seismologists and others interested in earthquake phenomena. The report offers a list of symbols and a set of definitions for terms pertaining to mechanics, elasticity, elastic waves, earthquakes, instruments recording earthquakes, and engineering. Suggestions on desirable changes are welcomed. - V. S.

7822. Bruckshaw, J. McG. Geophysical Prospecting and Engineering Problems. In the book: Blyth, F. G. H., A Geology for Engineers, London, Edward Arnold & Co., 1943, pp. 277-289.

The engineering problems, to which geophysical methods have been applied with success, usually are either problems of foundations for dams, bridges, highways, etc., or else problems of water supply. Of the various methods, two have been found most suitable for this work - the seismic method and the resistivity method. Originally, the resistivity method was employed almost exclusively. Since 1938 the seismic method was also adopted and is now regarded as standard. The two methods are briefly described with respect to underlying principles, field techniques, and apparatus; examples are given. A bibliography is appended. - V. S.

7823. Carreño, Alfonso de la. El volcan de Paricutin en las primeras fases de su erupcion. Consideraciones de caracter geofisico sobre el volcanismo (The Volcano Paricutin in the First Phases of Its Eruption. Geophysical considerations Regarding Volcanism). Irrigacion en Mexico, Mexico, vol. 24, No. 4, 1943, pp. 49-80.

Volcanism and associated earthquakes; treats of geology and chemistry especially but with mention of earthquake activity. Discusses the contribution to problems, possible through more adequate geophysical observations, including gravity and seismic. - N. H. Heck, Bibliography of Seismology, Dominion Observatory, Ottawa, No. 15, 1944, 255.

7824. Dana, S. W. The Partition of Energy Among Seismic Waves Reflected and Refracted at the Earth's Core. Bull. Seismol. Soc. America, Berkeley, Calif., vol. 34, No. 4, 1944, pp. 189-197.

The author calculates, for various angles of incidence, the ratios of energies of the waves reflected and refracted at the surface of the earth's core. He assumes that, as the core is approached, the material of the earth changes abruptly from an elastic solid to an elastic, greatly compressed liquid; the density of the core is regarded to be almost twice that of the surrounding mantle. In the calculations, Zoeppritz's equations are used, describing the general case of six boundary conditions in terms of the amplitudes and angles of reflection and refraction produced at the discontinuity between two media with different elastic properties. These general equations are applied to four cases of incidence of P and S in the mantle against the core. The mathematical discussion is presented. - V. S.

7825. Eby, J. B. Seismic and Resistivity Geophysical Exploration Methods. U. S. Waterways Experiment Station, Vicksburg, Miss., Tech. Memo. 198-1, 1943, 90 pp.

A complete report of field tests of the seismic refraction method and the resistivity method in expediting and reducing the cost of boring methods of subsurface exploration in connection with Levees in the Mississippi Valley. Tests were made at three sites. Seismic refraction profiles were run and resistivity depth curve data obtained which in many cases because of location could be correlated with nearby existing bore holes. It was found that the velocity of seismic wave travel in the underlying Tertiary material (the depth to which was sought) was equal to or less than that of overlying saturated alluvial beds. This condition rendered the seismic data uninterpretable.

Resistivity results showed that depth to the Tertiary could be determined with an average error of 11 percent compared to bore hole depths. This was checked at 15 points. Depths averaged from 150 to 175 feet. Resistivity work was considered adequate for engineering problems of determining the location of levees; combatting levee under seepage, and the location of revetments, as well as planning channel improvements where depth and general composition of alluvium are important factors.

The report gives detailed maps of the sites of the separate studies nd a discussion of the findings and interpretation of geophysical results. lso included is a section describing the principles of the seismic re- raction method and the resistivity method. Pictures of equipment are resented. The seismic apparatus was of special design for outdoor day- ight use and portable by hand. - D. W., Mines Mag., vol. 34, No. 10, 944, p. 565.

326. Gutenberg, Beno. Reflected and Minor Phases in Records of Near-by Earthquakes in Southern California. Bull. Seism. Soc. Am., Berkeley, Calif., vol. 34, No. 3, 1944, pp. 137-159.

This paper is a continuation of an investigation of 50 earthquakes in outhern California (Geophys. Abs. 119, No. 7680). The former study of bserved travel times is here combined with a new study of the corresponding mplitudes. As a result, an interpretation of seismograms becomes possible. t consists in postulating above the Mohorovicic discontinuity a certain tructure comprising a "granitic layer" and two intermediate layers; the ranitic layer may be frequently situated below sediments. The three ayers are discussed with respect to their depths, thickness, wave ve- locities, observed and calculated travel times, amplitudes, physical con- tants, etc. The entire structure is found well to explain the travel imes and amplitudes of the recorded waves. - V. S.

327. Gutenberg, B., and Richter, C. F. Frequency of Earthquakes in California. Bull. Seismol. Soc. America, Berkeley, Calif., vol. 34, No. 4, 1944, pp. 185-188.

The historical record of earthquake frequency in California was verified y means of a statistical comparison with the earthquake frequency in the orld as a whole. For this purpose, shocks were classified according to he instrumental magnitude scale. For the study of smaller shocks an area as delimited, including most of southern California, a small part of ad- acent Mexico, and the Owens Valley. The figures of frequency are presented nd discussed. It is found that the California-Nevada region has about 0 percent of the seismic activity in the entire United States. - V. S.

328. Gutenberg, B., and Ricter, C. F. Recent Results of Earthquake Study in Southern California. Trans. Nat. Research Council, Am. Geophys. Union, 1943, pt. I, Washington, D. C. 1943, pp. 95-96.

This report summarizes the results of several studies of earthquakes in outhern California. The studies have been partly published and partly are n preparation. The first synthetic investigation of earthquakes in south- rn California appeared in 1932 and dealt with wave velocities and travel imes at small distances. The subsequent studies cover 50 of the larger nd better recorded shocks, all but 5 later than 1937. They make use of ata much improved by the installation of Benioff seismometers with high agnification at most stations. They also benefit by the additional ex- erience gained in interpretation. - V. S.

7829. Hayes, R. C. Earthquakes in New Zealand During the Year 1943. New Zealand Journal of Science and Technology, Wellington, N. Z., B. General Section, vol. 25, No. 5, 1944, pp. 226-228.

The epicenters of principal earthquakes in New Zealand during 1943 are presented on a map. An accompanying list gives the dates, times, and maximal felt intensities of these earthquakes. The most notable feature of the year 1943 was the unusual amount of activity in the South Island, especially in the southwestern portion. There was also a marked concentration of activity in the Wairarapa region, most of the shocks being of slight intensity. - V. S.

7830. Heck, N. H. Japanese Earthquakes. Bull. Seism. Soc. America, Berkeley, Calif., vol. 34, No. 3, 1944, pp. 117-136.

The 61 principal Japanese earthquakes from 1596 to the present time are briefly discussed in regard to geographic distribution, destructive effects, and lessons from observations. The Formosa earthquakes are also listed and briefly characterised. - V. S.

7831. Hodgson, E. A. Recent Developments in Rockburst Research at Lake Shore Mines. Trans. Dom. Observ., Ottawa, vol. 46, 1943, pp. 313-324.

The development of high pressure in mine rocks is indicated by means of geophones which detect piezo-electrically the "subaudible snaps" which accompany slight yielding. The currents produced in the geophones are amplified to operate pen recorders. Suitably placed geophones can indicate high-pressure zones and detect their shift from one point to another and their development to danger point. - A. Hu, Sci. Abs., London, vol. 47, No. 554, 1944.

7832. Homma, S. On Rayleigh and Stoneley Waves (in Japanese, with an English summary). Jour. Meteorol. Soc. Jap., Tokyo, vol. 17, 1939, pp. 43, 442-450.

In this paper are obtained the general expressions of Rayleigh waves when there are two layers over a semi-infinite solid. A developed form of the characteristic equation is obtained. The expressions for Stoneley waves are obtained as special cases of the expressions for Rayleigh waves. By a simple numerical calculation it is shown that for Stoneley waves, when there is a layer of thickness H between two semi-infinite solids and the magnitudes of its elastic constants lie between those of the two semi-infinite solids, there are two dispersion curves, normal and abnormal. The velocity of Stoneley waves for $H = 0$ corresponds to the asymptotic value of the abnormal curve for $L/H \rightarrow \infty$, where L is the wave length. - Y. Kodaira, Zentralbl. Geophys. Meteorol. Geodäs., vol. 6, 1940-41, p. 20.

833. Jones, A. E. Earthquake Magnitudes, Efficiency of Stations, and Perceptibility of Local Earthquakes in the Lake Mead Area. Bull. Seism. Soc. America, Berkeley, Calif., vol. 34, No. 3, 1944, pp. 161-173.

A statistical study was made of seismographic registration in the Lake Mead area. The magnitudes of more than 1,000 local earthquakes were collected into frequency tables and polygons for the years 1941-42. This material led to several conclusions: (1) The efficiency (locating power) of he entire system increased with smaller distances between stations and better coverage attained by adding one more station. (2) The mode or the magnitude of the most frequently located shocks dropped from magnitude .0 in early 1941 to magnitude 2.5 when distances between stations and probable epicenters were reduced by the additional station. (3) More than half the total local energy released annually was expended in the largest shock or group of shocks. (4) The energy released by local earthquakes in 1942 approximately equalled that released in 1941. (5) Finally, the magnitude and perceptibility range of small shocks appeared to be a linear function of local distances; equations of this relationship are given. - V. S.

834. Kanai, Kiyoshi. Model Experiments for Confirming the Dissipation Phenomena (Scattering) in the Seismic Vibration of a Structure. Bull. Earthquake Res. Inst. Tokyo, vol. 17, 1939, pp. 37-48.

Model experiments were made for ascertaining the dissipation of energy of vibration of a structure into the ground. A gelatin cylinder with the upper end free and the lower end clamped was placed on a shaking table, and the inclination of the upper end was optically recorded on a sheet of bromide paper on the same table; then the cylinder was fitted into a cylindrical hole of a square gelatin block, and the vibration of the upper end was also recorded. In two such experiments it was ascertained that the maximum of the resonance curve in the latter case is smaller than that in the former case. The problem was solved mathematically when there is no viscous damping, and it was found that there is the same tendency between the two resonance curves, but since in the experiments the viscous damping is large, the mathematical solution gives only a qualitative result. The problem is very difficult when there is viscous damping and it was shown from a simple calculation that the two kinds of damping act in he same sense. - Y. Kodaira, Zeutrabl. Geophys. Meteorol. Geodäs., vol. 5, 1940, p. 78.

835. Kirillov, F. A. The Influence of the Depth of Blasting on Seismic Effects (in Russian). Akademiia Nauk S.S.S.R., Trudy Seismologicheskogo Instituta, Moscow, No. 106, 1941, pp. 74-77.

The depth of a blasting charge affects the magnitude of the seismic effect. The character of this dependence was studied during blasting at Magnitogorsk. The observations were conducted by means of the three-component electrodynamic vibrographs of Shnirman. Their sensitivity is 6 to 1 mm./sec., and their period varies from 0.5 to 0.9 sec. The testing ground consisted of diluvial clay and kaolinized rock. Two experiments were made. In the first, 13-kg. ammonite charges were used at distances of 14 and 22 meters from the instruments, at depths ranging from 3.2 to 18.0 meters. In the second experiment, 1.0-kg. charges were used at distances of 6 and 10 meters, at depths of 0.8 to 7.0 meters. The results for the main vibration phase and for the first vibration maxima are tabulated. Curves show the relationship between the depth of the charge and the change in the velocity of ground vibration. A formula is given for the computation of velocity at a certain point, and its applications are discussed. - V. S.

7836. Macdonald, G. A. The 1942 Eruption of Mauna Loa, Hawaii. Annual Report of the Board of Regents of the Smithsonian Institution, 1943; Washington, D. C., 1944, pp. 199-212.

The author gives an account of the 1942 eruption of Mauna Loa. He points to the seismic predication by R. H. Finch, presents the facts of early summit activity and flank eruption, and describes the lava flow and the bombing of the lava. In conclusion, three phases are distinguished in the flank eruption: (1) Initial extrusion, (2) restriction of the fountains, and (3) decline of the flow. - V. S.

7837. Oil and Gas Journal. Start Exploration Work on Union-Oil Company's Paraguay Concession. Tulsa, Okla., vol. 43, No. 34, 1944, p. 163.

The Union Oil Co. of California has started exploration on its concession in the Chaco territory, Paraguay. The Western Geophysical Co. is now conducting a seismic survey to outline areas favorable for drilling. No oil wells have been ever drilled in Chaco, and no rock outcrops were found there. Therefore, the seismological data will furnish the only guidance for mapping structures and judging the thickness of sediment. - V. S.

7838. Petrenko, E. E. A Net of Coordinates for Determining the Epicenter of an Earthquake (in Russian). Akademiia Nauk S.S.S.R., Trudy Seismologicheskogo Instituta, Moscow, No. 106, 1941, pp. 12-16.

In seismic observation it is important to locate the geographic position of the epicenter immediately after an earthquake has been recorded. The author mentions existing methods and points to their slowness. He offers a new method which is quick and sufficiently precise. Use is made of a net of coordinates with a center of projection chosen to correspond to the geographical azimuthal coordinates of a basic seismic station (such as the station of the Seismological Institute in Moscow). The net is drawn on the basis of formulas deduced from a spherical triangle PZK. In this triangle, P is the pole, Z the center of projection (such as station Moscow), K the sliding point with the coordinates φ and λ, r the distance from this sliding point to the center of projection, and α the azimuth of the sliding point with reference to the meridian of Z. The formulas for solving the triangle are given. The determination of the data was made by means of a method recommended by A. A. Mikhailov. The computations are described. - V. A.

7839. Petroleum Engineer. English Oil Field. P. E., Dallas, Tex., vol. 16, No. 2, 1944, p. 254.

An official disclosure was recently made that oil has been discovered in England during the war and is being extensively developed. The location of the oil fields is secret. The total production in the war period has reached 78,000,000 gallons. The seismic method of survey was employed and has proved to be of great value. - V. S.

7840. Ricker, Norman. Wavelet Functions and Their Polynomials. Geophysics, Menasha, Wis., vol. 9, No. 3, 1944, pp. 314-323.

This paper is a further extension of the author's wavelet theory of seismogram structure. The wavelet functions used in the previous paper are extended, a modified notation is adopted, and twenty four of the polynomials are given, together with their roots. Expressions are given for the displacement, velocity, and acceleration type wavelets. - Author's abs.

7841. Robles Ramos, Ramiro. El volcan de Paricutin y el neo-volcanismo Mexicano (The Volcano Paricutin and Mexican Neo-Volcanism). Irrigacion en Mexico, Mexico, vol. 24, No. 4, 1943, pp. 81-122.

Volcanism and associated earthquakes. Chiefly from viewpoint of volcanology. The mechanical and chemical aspects. Demonstrates that strong seismic activity is purely local. - N. H. Heck, Bibliography of Seismology, Dominion Observatory, Ottawa, No. 15, 1944, p. 264.

7842. Sadovskii, M. A. Determination of Seismic Danger-Zones in Blasting (in Russian). Akademiia Nauk S.S.S.R., Trudy Seismologicheskogo Instituta, Moscow, No. 106, 1941, pp. 64-73.

Heavy blasting unquestionably affects buildings, but the effects attributed by laymen are usually exaggerated. The author analyses the mechanism of the destructive action of blasts. The closer the vibration period of a building approximates the vibration period of the ground, the greater the destructive effect on the building. Therefore, these periods must be studied together. (1) The periods for typical classes of buildings have been determined by engineering research. They range from 0.3 to 1.0 seconds; the paper cites some values. (2) The periods for the blasting are expressed in formulas for different types of ground, in terms of distance up to 2,000 meters. Destructive effects at greater distances can be ignored. For practical purposes the periods for different ground would range from 0.01 to 0.30 seconds. (3) Previous studies at the Moscow Seismological Institute have shown that buildings on alluvial ground are destroyed only at velocities of propagation equal to, or exceeding, 12 to 14 cm./sec.; the formulas for velocity and amplitude are discussed. (4) The deformation of buildings is expressed by a formula given in terms of the velocity of ground vibrations, the ratio of the period of the building to the period of the ground, the extinction of the building's vibrations, and certain coefficients; several simplifying assumptions are made. This formula makes it possible to plot the curves of dependence of deformation on the distance and the force of blasting. (5) Finally, these curves serve for determining the radius of seismically dangerous zones; the values are tabulated. Various aspects of the problem are discussed. - V. S.

7843. Sawdon, W. A. The Oil Industry in Mexico. Petrol. Eng., Dallas, Tex., vol. 16, No. 1, 1944, p. 158.

Some geophysical prospecting is now in progress in Mexico. The seismic method is principally employed. The territory favorable for exploration includes the eastern part of the country stretching southward from the Texas border, along the Rio Grande and the coast of the Gulf of Mexico. It also covers the area extending some distance from the coast line and takes in the Yucatan Peninsula. There are, furthermore, possibilities in the southern part of Lower California. The greatest interest seems to center in the Tampico and Isthmus of Tehuantepec areas where production has been obtained. - V. S.

7844. Seismograph Service Corporation of Delaware. (1) Gulf, Mexican, and Caribbean Oil Zones. (2) South American Oil Zones. Oil and Gas Jour., Tulsa, Okla., vol. 43, No. 34, 1944, pp. 182-199.

The Seismograph Service Corporation of Delaware has prepared nine geological maps of oil zones in Central and South America. The maps show in different colors the depositional areas of major sedimentary geological systems, the locations of oil fields, and oil possibilities. They are presented in the following order: (1) Gulf, Mexican, and Caribbean Oil Zones: Jurassic, Cretaceous, Eocene-Oligocene, and Miocene-Pliocene; and (2) South American Oil Zones: Devonian, Permo-Carboniferous, Mesozoic, Eocene-Oligocene, and Miocene-Pliocene. Geological discussions accompany the maps. They deal with the deposition of each system as related to oil accumulation, region by region; some areas favorable for exploration are indicated. - V. S.

7845. Ulrich, F. P. Progress Report of Seismological Work by the United States Coast and Geodetic Survey in the Western United States During 1943. Bull. Seismol. Soc. America, Berkeley, Calif., vol. 34, No. 4, 1944, pp. 207-216.

The report gives an account of the work on the questionnaire program, rong motion, the tiltmeter, vibration, and instruments. A list of im-rtant earthquakes during 1943 is presented, with maps. Berkeley tilt-ams are illustrated by samples. The work of the Washington office is tlined. Earthquake activity during 1943 was again below normal for e second consecutive year. - V. S.

iss, Oscar. Report on the Geophysical Survey at Inhaminga. Incorporated in: Putnam, L. G., and Weiss, Oscar, Geological and Geophysical Report on the Inhaminga Structure Near Inhaminga, Portuguese East Africa, May 1935 (see abs. 7800 in this issue.)

46. Zapol'skii, K. K. Results of the Investigation of Seismographs for the Registration of Reflected Waves (in Russian). Akademiia Nauk S.S.S.R., Trudy Seismologicheskogo Instituta, Moscow, No. 106, 1941, pp. 57-59.

The Shnirman seismograph (Geophys. Abs. 119, No. 7694) has been tested the field. As a result, several improvements were introduced by the thor: (1) An increase in the seismograph's period from 0.010 to 0.020-030 seconds by means of additional springs; (2) control of the period thin 10 to 15 percent; (3) increase of the sensitivity of the instrument 5 to 7 times, at the work frequencies 40-60 Hertz; (4) elimination of e adhesion of the magnet to the cores; and (5) improvement of the damping-ston device, attained by using water instead of heavy oil and by elimi-ting the effect of temperature. These improvements are described and scussed. - V. S.

4. ELECTRICAL METHODS

47. Anderson, D. M. New Cable Design Increases Scope of Electrolog Operations. Tomorrow's Tools - Today, Los Angeles, Calif., vol. 10, No. 4, 1944, p. 15.

To facilitate deep electrical logging, the Lane-Wells electrolog has en equipped with an armored cable. This cable is a six-conductor type th reverse concentric armor. Such an armor reduces to a minimum the ble's elongation due to torque. The structure of the cable is described, d the effects of mud buoyancy on the cable's weight are discussed. - V. S.

uckshaw, J. McG. Geophysical Prospecting and Engineering Problems. In the book: Blyth, F. G. H., A Geology for Engineers, London, Edward Arnold & Co., 1943, pp. 277-289. (See abs. 7822 in this issue.)

48. Dienert, Frédéric. Méthode différentielle de prospection électrique du sous-sol (Differential Method of Electrical Prospecting of the Subsoil). Compt. rend. Acad. Sci., Paris, vol. 213, 1942, pp. 625-627.

Two tentative schemes are described for measuring variations in the electrical resistance of the subsurface. Both use a bridge connection and can operate on D. C. or A. C. The electrodes are made of carbon. One of the schemes employs three cables and works in the horizontal plane; the other uses four cables and operates in the vertical direction. The principles underlying the arrangements of the electrodes are discussed. - V. S.

Eby, J. B. Seismic and Resistivity Geophysical Exploration Methods. U. S. Waterways Experiment Station, Vicksburg, Miss., Tech. Mem. 198-1, 1943, 90 pp. (See abs. 7825 of this issue.)

7849. Fisch, W. Die geophysikalische Untersuchung von Kohlenvorkommen in der Schweiz (Geophysical Investigation of Coal Occurrence in Switzerland). Techn. Rdsch., vol. 34, No. 34, 1942, p. 17.

Electrical resistivity methods of prospecting are briefly outlined. As a practical example, the survey of a coal deposit in Switzerland is described. The deposit was a thin layer embedded in an irregular succession of Tertiary sandstone and marl. Resistivity measurements were made along two profiles at equal depths, on a slope 80 miles long covered with grass. In the diagram of results, separate subsurface layers showed up clearly, and correlation was possible. The coal layer itself was not distinctive, but it could be traced through indirect data. - V. S.

7850. Fritsch, Volker. Alcune indagini radiogeologiche eseguite nel 1939 (Some Radio-Geological Investigations Carried out in the Year 1939). Geof. pura appl., Messina, vol. 2, 1940, pp. 121-141.

The papers of the author on radio-prospecting made in 1939 are summarized. This work included surveys for ground water, for ore deposits, and for potassium deposits, as well as hydro-electric measurements. The summary also covers reports on the construction of a new apparatus for the application of high frequency to electrical prospecting. - V. S.

7851. Fritsch, Volker. Funkmutung (Radioprospecting). Ztschr. Ver. deut. Ingenieure, Berlin, vol. 87, 1943, pp. 136-137.

A brief summary is presented of electrical exploration by radioprospecting methods using high-frequency currents. Consideration is devoted principally to the method of "substitute capacity"; the sensitivity of instruments is here very high. The radioprospecting methods have been much in demand in recent years. They are particularly suited for the surveying of tectonic irregularities and ground-water masses, as well as for the detection of water in the desert. The interpretation of the data requires much experience. - V. S.

852. Gabriel, V. G. Electrical Resistivity Methods of Exploration. Petrol. World, Los Angeles, Calif., Annual Review, 1944, pp. 90-93.

Much information has been gathered in recent years on the electrical
esistivity of different constituents of the earth's crust. This infor-
ation is utilized by electrical resistivity methods for detecting various
eposits, or the structural and lithological conditions commonly associated
ith them. The methods employ direct or alternating currents of low fre-
uency, electrodes to introduce the current into the earth, and electrodes
ith various devices for measuring the current and the potential. A number
f field techniques have been devised. The author points to the Wenner
nd Gish-Rooney procedure, Lee's partitioning method, Jakosky's continuous
rofiling, etc. He briefly discusses Ohm's law, the multilayer problem,
ifficulties of oil detection, the correlation method, questions of
nterpretation, and the cost of surveying. A table shows the use of
arious resistivity methods in the United States from 1893 to 1944. - V. S.

853. Grosskopf, J. Das Strahlungsfeld eines vertikalen Dipolsenders über geschichtetem Boden (The Radiation Field of a Vertical Dipole Over Stratified Ground). Hochfrequenztechn., Leipzig, vol. 60, 1942, pp. 136-141.

Sommerfeld has given a mathematical function for the propagation of the
adiation of a vertical dipole in a homogeneous ground. The author uses
his function to calculate the propagation of radiation in a stratified
round; von Weyl has supplied the method. The calculation shows that
ommerfeld's function can be applied to a stratified ground if the com-
lex dielectrical constant of the upper stratum is multiplied by a cor-
ection factor. This factor depends upon the thickness of layers, the
requency, and the ground constants of separate layers. - V. S.

854. Marsch, B. Die elektrische Messtechnik in der geophysikalischen Bodenforschung (The Technique of Electrical Measurements in the Geophysical Exploration of the Ground). Elektr. im Bergbau, Munich, vol. 15, 1940, pp. 17-21.

Geophysical exploration of the subsurface is briefly explained. Then
description is given of the chief electrical prospecting methods. Wenner's
our-point scheme is outlined; a distinction is made between application to
ounding and to mapping. The method of natural potential is indicated.
t is further pointed out that seismic methods also use electrical measure-
ents in registering waves on the oscillographs. The principal seismic
ethods are described. A bibliography is appended. - V. S.

855. Müller, Max. Die Messung der Frequenzabhängigkeit der elektrischen Leitfähigkeit und Dielektrizitätskonstante von Gesteinsproben (Measurement of the Frequency Dependence of Electrical Conductivity and Dielectrical Constant on Rock Samples). Ztschr. Geophys., Brauschweig, vol. 18, 1943, pp. 59-66.

Measurements were made of the dependence of electrical conductivity
nd dielectrical constants on rock samples. The investigation was carried

out by means of resonance methods which are described. The results for sand samples have shown that when their dielective constant declines to one-fifth, their conductivity rises to the extent of 50 times within a range of 20 to 10,000 Hertz. - V. S.

7856. Muskat, Morris. The Interpretation of Earth-Resistivity Measurements. Am. Inst. Min. and Met. Eng., New York, Tech. Pub. 1761, 1944, 7 pp.

The method of R. W. Moore for determining subsurface interfacial depths by means of integrated curves of apparent resistivity (Geophys. Abs. 119, No. 7707) has been analyzed theoretically. It is found that the only unique tangents that can be drawn to such curves are the asymptotes at infinite electrode spacing and the tangents through the origin at vanishing electrode spacing. Explicit expressions have been derived for the relationship between the electrode spacing at the points of intersection of these tangents and the thickness of the surface strata as a function of the conductivity parameters for the two-layer and three-layer earths. It is found that in all cases the electrode spacing at the points of intersection will exceed 3/2 of the thickness of the surface layer, and may even become indefinitely large as the resistivity of the deepest layers increases as compared with that of the surface layer. These results do not agree with the empirical findings of Moore that the intersection of the tangent lines fall at an electrode spacing very approximately equal to the thickness of the surface layer. - Author's abs.

7857. Ramachandra Rao, M. B. Notes on the Underground Prospecting Work Carried Out for Testing the Geophysical Indication at Guddadaranga-vvanahalli, Chitalgrug District. Records Mysore Geol. Dept., vol. 41, 1942; Bangalore, 1943, pp. 54-57.

Electrical surveys were conducted near Guddadaragavvanahalli in Chitaldrug district, Mysore, during 1939-40 (Geophys. Abs. 114, No. 7059). Both the spontaneous polarization and equipotential methods were used. In 1940-42 the electrical findings were tested by excavation. A considerable lode of graphitic schist was found nearly 100 feet below surface. This lode corresponded almost exactly with the position marked out by the electrical surveys. In the surface outcrops no graphitic schists were seen anywhere. - V. S.

Thyer, R. F. Report on the Geophysical Surveys at the Wallaroo-Moonta Copper Field. South Australia Department of Mines, Mining Review, Adelaide, No. 77, 1942, pp. 41-48. (See abs. 7819 in this issue.)

7858. Tikhonov, A. N., and Turkisher, R. I. The Influence of an Intermediate Layer in Vertical Electrical Sounding (in Russian). Bull. Acad. Sci. U.R.S.S. (Izvestiia), Série Géographique et Géophysique, Moscow, No. 5, 1942, pp. 219-227.

A study is made of the electrical field of a point-source situated ver a three-layer medium possessing the following horizontal distribution: 1) The upper layer is supposed to have a constant conductivity σ'_0 and thickness "h"; (2) the lower layer is assumed to have a conductivity $\sigma' =$; and (3) the two layers are separated by a layer of thickness equal to 2, the conductivity of which is decreasing linearly from σ'_0 to σ'. A ormula for the apparent resistivity is derived, and a graphical repre- entation of this resistivity is shown in a figure. - W. A.

859. Wallace, W. E., Jr. Structure of South Louisiana Deep-Seated Domes. Bull. Am. Assoc. Petrol. Geol., Tulsa, Okla., vol. 28, No. 9, 1944, pp. 1249-1312.

A set of 1,000 electrical logs was used to study the subsurface structure f Louisiana oil fields. A coastal belt about 75 miles wide was covered. ttention was devoted particularly to the deep-seated domes in which the alt had not been reached. The types commonly found in this group are escribed. The most frequent type consisted of domed sediments with normal aults creating a graben. Typically, all of the structures studied con- ained normal faults. Such faults could be broadly divided into major and inor. These varieties are outlined. The distribution of oil and gas in he region is discussed. The log data are illustrated by numerous ex- mples of cross sections at the various oil fields. - V. S.

860. Wichmann, H. Predischarge Fields and Duration of Field Changes Due to Lightning. Gerlands Beitr. Geophys., Leipzig, vol. 59, No. 1, 1942, pp. 42-48.

From measurements of field changes due to lightning discharges by means f an earth plate, an aerial and a point-discharge recorder, comparatively slow field changes are found to precede some lightning discharges, partic arly between clouds. The total duration of field changes is investi- ated and the results are subdivided according to storms with a pre- ominance of cloud-to-cloud and cloud-to-earth flashes respectively, and o the earlier and later phases of a thunderstorm. - R. H. G., Sci. Abs., ol. 47, No. 560, 1944.

861. Wichmann, H. Field Changes of Lightning Discharges Between Clouds and to Earth. Gerlands Beitr. Geophys., Leipzig, vol. 59, No. 3/4, 1943, pp. 299-305.

Further registrations with the methods described (see above) confirm he different types of field changes caused by cloud-to-cloud and cloud- o-earth strokes. The predominance of the two types of discharges in arious storms and a possible history of an average storm are discusses. R. H. G., Sci. Abs., vol. 47, No. 560, 1944.

5. RADIOACTIVE METHODS

7862. Beers, R. F. Radioactivity and Organic Content of Some Paleozoic Shales. Bull. Am. Assoc. Petrol. Geol., Tulsa, Okla., vol. 29, No. 1, 1945, pp. 1-22.

By measurement of the total beta activity, the total alpha activity, and the radium content, a new method has been developed for the routine determination of radioactive substances in sedimentary rocks. The important radioactive elements in these rocks are uranium, thorium, and potassium. Earlier work by Beers and Goodman has shown that these radioactive elements may be found largely in three principal loci: (1) In association with the heavy minerals of sands and sandstones; (2) in K^{40}, the active isotope of potassium which is found in evaporites, oil-field brines, clastic fragments of micas and other potassium-bearing minerals, and in clays and shales which may contain up to 6.5 percent potassium; (3) in the uranium and thorium content of shales and clays, impure limestones and marls, shaly sandstones, and organic sediments. Pure limestones and pure quartz sands are found to exhibit practically no measurable radioactivity. Black shales containing up to 16 percent organic matter have been found to contain high concentrations of the three principal radioactive elements. Excellent correlations are shown to exist between uranium content, the thorium-uranium ratio and carbon content in individual shale formations. These studies throw new light on three important problems: (1) The sedimentation environment of Paleozoic black shales, (2) the evolution of petroleum source beds, (3) the relationship of radioactive and organic matter in these beds. - Author's abs.

7863. Gerling, E. K. Age of the Earth According to Radioactivity Data. Compt. rend. (Doklady) Acad. Sci. U.R.S.S., Moscow, vol. 34, No. 9, 1942, pp. 259-261.

Previous estimations of the age of the earth from the content of radioactive elements in its crust are briefly reviewed. A new computation is given, based on the isotropic composition of leads of different age and origin. The age of the earth is established as $\not< 3 \text{ x } 10^9$ to $4 \text{ x } 10^9$ years. - A. E. T., Sci. Abs., vol. 47, No. 560, 1944.

7864. Morgan, Joseph, and Bohn, J. L. Experiments on the Theory of the Action of the Geiger Point Counter. Jour. Franklin Inst., Lancaster, Pa., vol. 237, No. 5, 1944, pp. 371-384.

Curves are included showing the relationship between voltage and relative position of electrodes, and between voltage and counter gas pressure. Also included are experiments on the preparation of sensitive and insensitive points, and experiments with different electrode materials. These data are for a counter operated with the point at negative potential. Zeleny's conclusion that a high resistance layer of adsorbed gas exists at the point is adopted. In addition, the assumption is made that the

eld at the point at the onset of "self-counting" is sufficient to pro-
ce auto-electronic emission. This combination now leads to a theory
ich accounts for the various characteristics of the counter and ex-
ains the threshold of counting curve, the auto-counting curve, and the
ntinuous discharge curve. Probability considerations account for the
lective counting of different ionizing agents in certain voltage ranges,
r the dependence of counting upon path of ionizing through the chamber,
d for the increase of counts with increase of voltage from threshold
counting to the point where all rays are registered. - Authors' abs.

65. Rajewsky, B. Das Geiger-Müller Zahlrohr im Dienste des Bergbaues (The Geiger-Müller Counter in the Service of Mining). Ztschr. Physik, Berlin, vol. 120, 1943, pp. 627-638.

Deposits with radioactive admixtures, such as radium ores, potassium
tcrops, oil accumulations, etc., can be detected by means of measurements
gamma-ray intensity. The Geiger-Müller counter usually serves for this
rpose. As regards detecting instruments, there arises the problem of
sensitivity either receptive in all directions and exploring a symmetrical
here, or receptive along a single line and exploring a definite direction.
th characteristics are essential in exploration. The author discusses
ese and related requirements. Information is further furnished on new
struments specially adapted for boreholes. - V. S.

66. Rona, Elizabeth. Radioactivity of the Ocean (Abs.)Jour. Washington Acad. Sciences, Menasha, Wis., vol. 34, No. 5, 1944, p. 162.

It has been shown that the ocean sediments, especially those lying
low very deep water and far from the continent, have radium content 4
10 times greater than that of rocks, even of granite. In order to
arn whether the origin of this high radium content can be explained by
chemical or biological precipitation from sea water, samples from dif-
rent locations and different depths were investigated by H. Pettersson
d the author, and C. S. Piggott and W. D. Urry and the author. In both
ts of samples the amount of radium was found to be very low, in dis-
reement with the results found by former scientists, but in good agree-
nt with R. D. Evans and collaborators. The uranium content in the
ters around the west coast of Sweden and in the northern Atlantic was
und higher, as is necessary to uphold the equilibrium for radium found
the same samples, whereas in the sea-bottom sediments the relation of
dium to uranium was just the opposite. No possible explanation can be
fered yet, until further investigations have been made. - Author.

67. Sen Chowdhury, P. K. Radium Content of Ceylon Thorianite. Indian Jour. Physics, Calcutta, vol. 17, No. 5, 1943, pp. 257-261.

A pliotron-amplifier has been set up for the study of many interesting
clear and radio-active phenomena. With this amplifier and ionization
amber, the radium content of a sample of Ceylon thorianite has been

estimated by the well-known gamma-ray method of estimation. The amount of radium present approximately amounts to 5.94×10^{-8} gm. per gm. of the mineral. - Author's abs.

7868. Simpson, J. A., Jr. Reduction of the Natural Insensitive Time in G-M Counters. Phys. Rev., Lancaster, Pa., vol. 66, Nos. 3-4, 1944, pp. 39-47.

The limitation on the Geiger-Müller counter insensitive time which is imposed by the presence of the positive ion space charge has been reduced by collecting the positive ions on the counter center wire instead of at the outer cylinder. The electronic circuit which carries out this process is described in detail. A reduction by another order of magnitude in the insensitive time or an insensitive time of about 2×10^{-5} sec. is obtained with no indication that the limit of the new method has been reached. The general properties of an inverse counter are discussed. The mechanism of this mode of counter operation is explained with considerable evidence indicating the presence of three distinct ion-collection regions for the negative center wire. A stable circuit useful as a research tool has been devised for use with a large variety of counters. - Author's abs.

7869. Starik, I. E. Earth's Age by Radioactive Data (Abs.). Internat. Geol. Cong., 17th Sess., U.S.S.R., 1937; Abs. of Papers, Moscow, 1937, p. 192.

Radioactive methods serve to measure both the geological age and the astrophysical age of the earth. The geological age can be determined: (1) By the lead technique (maximum age 1,600 million years), (2) by the helium technique (maximum age 900 million years), and (3) by the aureole technique (maximum age 800 million years). The astrophysical age of the earth can be determined: (1) By the lead technique using the interrelations between the average quantities of Pb, U, and Th in the earth's crust, or else the relationship AcD:RaG in ordinary lead; and (2) by the helium technique based on the results of meteorite analysis. The most probable astrophysical age of the earth so determined approximates the results obtained by other methods. - V. S.

7870. Terrestrial Magnetism and Atmospheric Electricity. Note: Geiger Tube. Baltimore, Md., vol. 49, No. 4, 1944, p. 266.

Workers in radiation now have commercially available a practical, well-constructed Geiger Tube manufactured by the Cyclotron Specialties Company, Moraga, California. This new Geiger-counter tube, 3.5 inches in diameter by 5 inches long, has a mica window, only 0.0006 inch thick with an effective area of 15 square centimeters. It has an exceptionally level, broad plateau of 250 volts, with a background of only one or two counts per second when shielded with 2 inches of lead. The sensitivity to beta-rays is high, and the over-all efficiency is at least 40 percent.

71. Zwerger, R. von. Erdölgeologische and -technische Auswertungsmöglichkeiten von radioaktiven Bohrlochuntersuchungen (The Evaluation of Geological and Technical Possibilities of Oil Finding by the Radioactive Investigation of Boreholes). Oel u. Kohle, Berlin, vol. 39, No. 12, 1943, pp. 333-352.

The author describes the radioactive investigation of boreholes and scusses its application to oil finding. The underlying facts of physical iences are indicated. An outline is given of the development of gamma- y measurements and techniques, the accuracy and speed of measurements, d the sensitiveness of apparatus. The data obtained by measurements e described and illustrated by samples of logs and drawings. Consider- ion is further devoted to questions of the gamma radiation of clays, anium accumulation in clay sediments, negative readings for oil sands d lime, discrepancies in measurements, laboratory and surface checks, d geological interpretation. Finally, the uses and possibilities of dioactive methods in oil exploration are critically examined. Numerous ferences to American and Russian literature are made throughout the xt. - V. S.

6. GEOTHERMAL METHODS

872. Courtener, A., and Chudnovskii, A. A Probing Instrument for the Investigation of Heat Conductivity in the Ground (in Russian). Zurnal Tekhnicheskoi Fiziki, Leningrad, vol. 9, 1939, pp. 1430-1432.

In geothermal investigations of heat conductivity, special cylinders heat-conducting material have been used with thermometers. A new in- trument is now offered, combining in a single unit a heat-conducting dy and a thermo-element. The conducting body has the dimensions 70 x x 6 mm. The advantages of this apparatus in comparison with the cy- inder are indicated. - V. S.

873. Kraskovsky, S. A. The Apparatus for Geothermal Measurements in Boreholes (in Russian). Akademiia Nauk S.S.S.R., Trudy Komissii po Geotermike, Moscow, Vypusk I, 1941, pp. 45-49.

The first geothermal measurements in Russia were made in the seventies the 19th century; the same primitive instruments were used as in Europe t that time. Continuous improvements were effected in later surveys. In 893 Iachevskii employed a mercury thermometer with the bulb wrapped in otton and sealed with paraffin; it was lowered into a borehole in an iron ylinder. Later Iachevskii introduced a hermetic steel cartridge. Gradually his cartridge was equipped with outside springs for preventing swinging, double screw lid, a rubber bumper bottom, and an inside support with olders for several thermometers. As a result, the instrument gained in eight, so that much time was required for measurement. Therefore, other rinciples of measurement were tried. Kuznetsov designed a thermograph imilar to meteorological models, but it proved to be inaccurate. Kuznetsov nd Altberg constructed an electrical resistance thermometer which was likewise unsatisfactory. Finally, in 1931 the Geothermal Division of the Geophysical Institute perfected the mercury thermometer. Devices were provided for a speedy lowering of the cartridge and for a measurement of depth. Inside the cartridge is now placed a brass container with three thermometers. Broad slits in the outer walls facilitate readings of the temperature. - V. S.

7. GEOCHEMICAL METHODS

7874. Kriegel, M. W. Analysis for Hydrocarbons in the Presence of Nitrous Oxide. Geophysics, Menasha, Wis., vol. 9, No. 4, 1944, pp. 447-462.

The technique for the analysis of soil air for small quantities of hydrocarbons is reviewed. Various methods of expressing results and the basis for the calculation of each are given. Field data on expansion ratios are presented to show that a gas, other than the saturated hydrocarbons, exists in the soil air, which is not removed by the screening agents and is retained in the condensation trap. The reasons for believing that this gas is nitrous oxide are given, together with plausible sources of this gas in the soil air. Laboratory data are presented on the analysis of pure hydrocarbons in the presence and in the absence of this gas. Calculations made by each of the methods show that when results are based on after-burning readings, a true measure of the hydrocarbon content is evolved, regardless of the presence of nitrous oxide. - Author's abs.

7875. Theodorovich, G. I. Sulfur in the Buguruslan Oil Region. Comptes Rendus (Doklady) de l'Academie des Sciences de l'U.R.S.S., Moscow, vol. 39, No. 3, 1943, pp. 118-120.

Previous observations in the Sterlitamak-Ishimbaevo oil region had led the author to conclude that when the roof of an oil deposit and its gas cap are disturbed, a sulfur-bearing zone is formed in the overlying formations (Geophys. Abs. 117, No. 7444). The present observations on the occurrence of sulfur in the Buguruslan oil region tend to support this conclusion. They fall into two groups: (1) In the southern wings of the Bolshe-Kinel'skii uplift, and in its continuation northwestward, natural sulfur occurs inside the water-oil zone, while the industrial oil deposits lay immediately to the north. (2) In the north-western direction and in the northern part of this uplift, the gas and water-bearing zones approach one another; here natural sulfur is scattered over a wide aureole, and the possibility of oil occurrence is limited. It is deduced from these observations that, in oil prospecting, the presence of natural sulfur in spiriferous deposits under an anhydrite cover points to the existence of peripheral zones of a gas-oil deposit in the formation below. - V. S.

876. Williams, Neil. Mud-Analysis Logging. Petroleo Interamericano (printed in Spanish and English), Tulsa, Okla., vol. 2, No. 3, 1945, pp. 70-73.

The detection of oil during well drilling can be facilitated by mud nalysis. The latest technical improvements in such analysis are described. hey include special apparatus for the determination of the hydrocarbon ontent of the drilling fluid, depth meters, automatic drilling-rate eters, pump-cycle counters, mud-pressure recorders, torque indicators, eight-on-the-bit indicators, warning devices for possible blow-outs and rouble from intrusion of high-pressure salt-water flows, etc. A schematic ay-out of a movable laboratory installation is given, and a profile illustrates the mud-analysis log. - V. S.

8. UNCLASSIFIED METHODS AND TOPICS RELATED TO GEOPHYSICS

877. Aerial, Geological, and Geophysical Survey of Northern Australia. Report for Period Ended 30th June, 1940. Parliament of Commonwealth of Australia, Govern. Printer, Canberra, 1940.

Reports are given on the Lawn Hill-Wollogorang district, the Hodgkinson district and the Cairns district in Queensland, and the Wauchope Creek istrict, Northern Territory. A geophysical survey was conducted in the Redbank copper field, Northern Territory. - R. O. Chalmers, Australian Sci. Abs., vol. 20, No. 6, 1942, p. 42.

7878. Bays, C. A., and Folk, S. H. Developments in the Application of Geophysics to Ground-Water Problems. Illinois State Geol. Survey Circ. 108, Urbana, 1944, 25 pp.

Geophysical exploration can locate ground-water supplies and is useful or drilling, completing, and producing water wells. The authors briefly summarize such work in the past and outline recent applications in Illinois. 1) In surface surveys, electrical resistivity, electrical potential, magnetic, seismic, gravitational, thermal, radioactive, and radio methods have een employed, with varying success. Most work was done by the electrical esistivity method. The Illinois Geological Survey used the Gish-Rooney lectrical resistivity circuit in a modified form; the principle is escribed. (2) In subsurface surveys, electrical resistivity, electrical otential, thermal, and sonic methods have been applied for logging the wells. The Illinois Geological Survey employed most of these methods; the equipment is described. Electrical logs, temperature logs, and fluid-resistivity logs are discussed, and samples of curves are given. The conclusion is drawn that geophysical surveys of water supplies have proved their usefulness beyond doubt. A further development of geophysical techniques and instruments for ground water exploration is advocated. A discussion by N. A. Rose, P. A. Dickey, E. W. Bennison, O. F. Ritzmann, P. D. Krynine, W. V. Howard, C. D. Adams, and C. A. Bays follows. - V. S.

7879. Bruckshaw, J. McG. Geophysical Methods Applied to Oil Prospecting. Jour. Inst. Petrol., London, vol. 30, No. 250, 1944, pp. 271-312.

This paper is a part of a symposium on modern petroleum technology initiated by the Institute of Petroleum, London. It describes in popular language the principal geophysical methods applied in oil prospecting. The author covers the seismic, gravitational, electrical, and magnetic methods. He deals with underlying principles, applications, interpretation, results, advantages and limitations. Information relating to instruments and field techniques is omitted. The text is illustrated by drawings. A discussion accompanies the paper. - V. S.

7880. Bilbao la Vieja, G. V. Exploracion Geofisica (Geophysical Exploration). Mineria Boliviana, La Paz, vol. 1, No. 6, 1944, pp. 22-24.

The usefulness of geophysics in the exploration of Bolivian resources is discussed. The magnetic, gravimetric, electric, and seismic methods are briefly outlined. - V. S.

7881. Cooke, A. C. H. Lane-Wells Gun-Perforator Operations Below 15,000 Feet. Tomorrow's Tools - Today, Lane-Wells Co., Los Angeles 11, Calif., vol. 10, No. 3, 1944, pp. 16-17.

The oil well of the Phillips Petroleum Co. in Pecos County, Tex., is 15,270 feet deep. Gun-perforating operations were made in this well. They show the practical potentialities of existing instruments. The standard Lane-Wells truck and servicing equipment for casing perforation was used. The temperature at the depth of 15,250 feet was 242° F. The pressure of the mud at the bottom of the hole approximated 8,400 pounds per square inch. 112 holes were shot in 5 perforating runs. The total time required was 16.5 hours. - V. S.

7882. Gregersen, A. I. Exploratory Activity and Oil and Gas Discoveries in California - 1944. California Oil World, Las Angeles, Calif., vol. 37, No. 22, 1944, pp. 1-11.

The author gives statistics on oil exploration in California during the first 9 months of 1944. This period represents an all-time high in California exploratory drilling, but the average oil reserves per field discovered will probably reach the lowest point in California history. Exploration generally increased in efficiency. Of the total exploratory holes drilled in 1944, 23.2 percent were successful compared with 18.0 percent in 1943. However, two types of wildcats showed greater failures. The wildcats drilled on subsurface geology alone were 11.8 percent successful this year compared with 18.2 percent las year. Likewise, the wildcats drilled on seismograph work were 19.5 percent successful in 1944 compared with 27.0 percent in 1943. - V. S.

7883. Heiland, C. A. Geophysics. Min. and Met., New York, vol. 26, No. 458, 1945, pp. 99-104.

Geophysical exploration conducted in the Western Hemisphere in 1944 is reviewed from a technical and statistical standpoint. For the United States, the review covers oil exploration, well logging, mineral exploration, progress of field techniques, and the material and manpower situation. (1) Oil exploration in 1944 has been ahead of 1943 by nearly 30 percent. The monthly average of prospecting crews in the field was 451, while in 1943 it was 340. (a) All geophysical methods participated in the gain. In terms of total activity, seismic operations amounted to 67 percent; gravimeter operations, to 28 percent; and other methods, to 5 percent. As compared with the 1943 average, seismic work increased 18-1/2 percent; gravimeter work, 73 percent; and other methods, 92 percent. In comparison with the pre-war average of 1941, seismic operations increased 58 percent; gravimeter operations, 88 percent; and other methods, 283 percent. (b) The distribution of activities over different parts of the United States has reflected the increased interest in southeastern States following discoveries in Miss., Ala., and Fla. As a result, Tex., La., Miss., Ala., and Ark. claimed about 55 percent of total activity; Okla., Kan., Neb., and Mo. 14 percent; Wyo., Mont., Colo., and N. Mex. 14 percent; Fla., Ga., Va., and Carolina, 10 percent; Calif., 4 percent; and Mich., Ill., 3 percent. The principal discoveries in the various States are briefly described, and the success of different methods is indicated. (c) The average monthly financing of oil exploration in 1944 came to nearly 3 million dollars. This figure is computed on the assumption of an average cost of $8,000 for a seismic crew, $4,000 for a gravimeter crew, and $2,000 for other crews. (2) Well logging has kept in step with prospecting. (a) The number of electrical well-logging operations was about 12,000 for 1941, 9,000 for 1942, 11,000 for 1943, and is expected to reach about 15,600 for 1944. In terms of total wells completed, electrical well-logging operations numbered 37 percent in 1941, 43 percent in 1942, 57 percent in 1943, and about 64 percent in 1944. (b) With an average cost of $300 for an electrical logging operation, the total expense for oil prospecting and well logging was in 1944 slightly more than 40 million dollars, against $31,500,000 in 1943. This represents an increase of 28 percent. (3) Minerals Exploration has increased under the pressure of the war. The Bureau of Mines investigated a number of new prospects in California, Nevada, Oregon, Idaho, and some of the Eastern States; magnetic surveys were made in Michigan, near Iron River. The Division of Geophysical Exploration of the Bureau has conducted geophysical surveys in the central region; magnetometer and resistivity surveys were made on magnetite deposits in southwestern and central Missouri, self-potential surveys for zinc in southern Missouri and southwestern Wisconsin, and gravity surveys for zinc in the Tri-State district. The surveys made by private companies are also indicated. (4) Field techniques have shown progress in various respects. (a) Seismic surveying has been reverting to refraction work in areas where reflection shooting offered difficulties; examples are given. (b) Gravity work is increasingly conducted on a regional basis, with attendant advantages in interpretation. (c) Electrical prospecting promises further developments: the Elflex Co. has continued its work with low-frequency transients. (d) Soil analysis has been advanced by S. J. Pirson who reports a discovery made by the improved method in Jack County, Texas. (e) Logging techniques now combine the use of gamma-ray and neutron logs; the temperature log has possibilities in geothermal exploration; the spontaneous-potential dip meter is gaining in application. (5) Material and manpower shortages have retarded progress in geophysical field-work and laboratory research. Material has been insufficient particularly for automotive and drilling equipment. Available manpower has not met the needs of the industry. Though some technicians and research workers were released from certain types of civilian war work by the Government, the number of experienced observers, computers, and party chiefs is still much too small for the expansion demanded by oil consumption and the state of reserves.

Geophysical exploration in the other countries of the western hemisphere has reflected the increased activity in the United States. Various surveys for oil are indicated in Latin America; particular attention is devoted to exploration for metals in Canada. - V. S.

7884. Henney, Keith. Prospecting for Petroleum. Sci. American, New York, vol. 170, No. 5, 1944, pp. 208-210.

A brief review is given of various applications of electronics to prospecting for oil. Electronic prinicples and equipment are used in electrical logging, gamma-ray logging, the tracing of carnotite cement, mud analysis, ultraviolet-light fluorescence techniques, refraction seismograph amplifiers, etc. Moreover, the modern instruments employed in the gravimetric, magnetic, seismological, thermal, and electrical methods usually include some electronic devices. Particularly fruitful are the applications of electronics in reflection seismography. - V. S.

7885. Hügel, Helmut. Orientierte Kerne (Oriented Cores). Oel u. Kohle, Berlin, vol. 38, 1942, pp. 1052-1060.

Oriented borehole cores supply information on the inclination of subsurface layers. There are different methods of orienting cores. The author briefly outlines the mechanical, magnetic, and electrical methods. He then describes in detail his own method developed in the oil fields of Astra Romana in Rumania and used there since 1937. The apparatus is based on a mechanical principle. It consists of pipe which is divided into sections and prevented from rotating. This pipe contains the instruments of orientation and is hung on two rollers in the borehole. The instruments are primarily a pendulum, an orienting magnet, a marking lever, and a releasing clock. The operation of the apparatus is described and clarified by two examples. - V. S.

7886. Illing, V. C. Geophysics Applied to Oil Geology. Quart. Jour. Geol. Soc. London, London, vol. 98, Nos. 391-92, 1943, pp. lxxxv - lxxxvii

Petroleum geology searches for oil-bearing structures by drawing inferences from surface characteristics as to the subsurface configurations. Such inferences are based upon the assumption of a parallelism between the deeper formations and those exposed at the surface. This parallelism does not always hold true. The possibilities of discrepancy make the more direct geophysical methods preferable. Though these methods are usually expensive, oil discovery offsets their costs. The author briefly outlines the main geophysical methods and their uses. He gives examples of oil finding by these methods. - V. S.

7887. Imperial Oil Review. The Search for Oil in Saskatchewan. Toronto, Ontario, vol. 28, No. 2, 1944, pp. 6-9.

In Saskatchewan a heavy overburden covers the bed rock, so that no indications are available regarding the subsurface. The Imperial Oil Co. of Canada has sent repeatedly geological parties for oil prospecting, but they were unsuccessful. In 1940 exploration was expanded to include gravimetric, seismic and core-drilling work. (1) The gravimetric surveys covered nearly 11 million acres during 1940-41, but they were found unsuited for the Saskatchewan subsurface and have been discontinued. (2) The seismic method proved to be more promising, and some 5 million acres had been surveyed to the end of 1943; this work is continued. (3) The study of cores has included drilling, laboratory analysis, and an examination of the available logs of the water wells in Saskatchewan. This combined exploration has covered 54,600 sq. miles in 3 years and brought to light a number of areas favorable to the accumulation of oil. The surveyed regions are shown on maps. The Imperial Oil Co. and the Norcanols Oil & Gas Co. have taken leases. Eight holes have been drilled by them. In no instance has production been obtained. - V. S.

7888. Krynine, P. D. The Future of Oil Finding. Oil Weekly, Houston, Tex., vol. 116, No. 7, 1945, pp. 26-30.

In Pennsylvania a vast majority of oil fields is of the petrological type, usually termed "stratigraphic trap". Such oil occurrences are related to primary sedimentary processes, and little is known about finding them. At the Pennsylvania State College the problem of search has been approached through studies of the fundamental principles of sedimentology. The author discusses the results of these investigations. He finds that there exists a direct connection between large accumulations of oil and certain sedimentary processes forming end-phase concentrates. These processes leave on the rocks many imprints besides producing oil. Accordingly, the imprints can be used as oil-finding criteria in prospecting for oil. The nature of such petrological criteria is briefly indicated. - V. S.

7889. Nature. Geophysical Exploration in Canada and the United States. Nature, London, vol. 153, No. 3886, 1944, pp. 503-504.

Geophysics is used for exploring the subsurface at depths inaccessible to geology. Such surveying is cheaper than exploratory drilling. The progress achieved during 1924-39 in the use of four geophysical methods - seismic, magnetic, gravimetric, and electric - is briefly indicated. The principal areas surveyed in the United States and Canada are specified. - V. S.

7890. Northern Miner. How to Claim Allowances for Geophysical Work. N. M., Toronto, vol. 30, No. 39, 1944, p. 6.

The Department of Mines for Ontario has issued instructions regarding submission of the results of geophysical exploration, as required under section 78 (11) of the Mining Act. In claiming allowances of assessment on the basis of geophysical expenditures, the mining companies and licensees are required to present to the Department: (1) Receipts for expenditures; (2) maps of the claims on which the work was done; (3) contour and profile maps of geophysical results; and (4) interpretation and correlation of results. The purpose is to stimulate geophysical exploration. All the material will be kept on file at the Department in Toronto. - V. S.

7891. Northern Miner. Seven Years' Geophysical Work in Ontario Reviewed. Toronto, vol. 30, No. 39, 1944, p. 11.

A review is presented of the geophysical work conducted by the Ontario Department of Mines from 1937 to date. The magnetic, electrical resistivity, self-potential, and gravitational methods were employed. Exploration centered in the areas of Pickle Lake, Steeprock Lake, Little Long Lac, Madoc, Kirkland-Larder, and Southwestern Ontario. The review outlines the nature of the work, gives conclusions as to what geophysical methods may do, and advances suggestions as to how they may be developed and applied. In conclusion, the author makes a résumé of the general status of geophysical methods, indicating their advantages, limitations, and the possible remedies. - V. S.

7892. Oil and Gas Journal. England's Only Oil Field Is Most Strategically Located Allied Supply. Tulsa, Okla., vol. 43, No. 34, 1944, pp. 253-255.

In May 1939 an oil deposit was discovered in Lancashire, England. The initial clue came from outcroppings in a nearby colliery. A geophysical investigation of the area showed favorable anticlinal conditions. This discovery was made after extensive geophysical exploration in England, and it has lead in turn to more exploration. The seismic method was the one generally employed. The area surveyed during the war period has amounted to 1,300 square miles. - V. S.

7893. Ospina-Racines, E. Colombia Entering New Era of Widespread Exploration. World Petroleum, New York, vol. 15, No. 10, 1944, pp. 61-65.

The author describes the present development of oil exploration in Colombia. Surface and geophysical prospecting has been carried out in all the promising oil areas of the country. Currently, the Tropical, Shell, Texas, Socony, Richmond, and Gulf Companies are making surveys in the Llanos, Caribbean and Mid-Magdalena oil districts. Eight seismic crews, one magnetometer crew, and three gravimeter crews are operating in the field. The recent work includes a gravimetric survey of the southern part of the Pacific coast from the Ecuadorean border to the Patia River; further work is scheduled in the northward direction. A map is given of the distribution of oil fields in Colombia. - V. S.

7894. Rohr, K. Oriented Hand Coring in Geological Field Work. Jour. Inst. Petrol., London, vol. 30, No. 244, 1944, pp. 81-89.

The use of oriented hand coring improves exploration techniques because it provides factual checks on them. A successful application of augering was made by V. C. Illing and H. G. Kugler in 1920, in the course of exploratory mapping of oil districts in Trinidad. A specially designed equipment for oriented hand coring has been introduced by the author in 1941. Its several parts are described. The coring instrument proper consists of an outer string, an inner string, and a core-barrel assembly. The accessories include a core extractor and a table for core orientation. This equipment is used with augering tools comprising a 1-3/4-inch-diameter auger bit run on a 3/4-inch pipe. The coring procedure involves lowering the coring instrument oriented northward into the auger hole, coring the bottom by strokes with the upper link of the drive rod, recovering the core without disturbing its orientation, and preparing the core for determination of strike and dip. The efficiency, costs, labor, and advantages of hand coring are indicated. - V. S.

7895. Sawdon, W. A. Colombia Is Active Both in Development and Exploration. Petrol. Eng., Dallas, Tex., vol. 16, No. 1, 1944, pp. 78[illegible]1.

Geophysical work in Colombia is done at present by the Tropical, Shell, Socony-Vacuum, Richmond Petroleum of Colombia, and Texas Companies. The Gulf interests are contemplating immediate seismograph surveys. Several other companies are expected to do geophysical exploration in the near future. Generally, the regions to be surveyed include the llanos areas in the south and the northern areas where all commercial production to date has been obtained. - V. S.

7896. Science. The Institute of Geophysical Technology at St. Louis University. Lancaster, Pa., vol. 100, No. 2604, 1944, p. 466.

The Institute of Geophysical Technology at St. Louis University is organized as an autonomous school. Its curriculum has three distinct levels: (1) In the lower division, 2 years are devoted to a single program in the basic sciences and engineering; (2) in the upper division, specialized programs are offered for the bachelor's degree in the fields of petroleum geophysics, mining geophysics, seismological engineering, geological engineering, radio communications engineering, applied electronics, and professional meteorology; (3) on the graduate level, research and advanced study lead to the master's and doctor's degrees in these fields, under the auspices of the Graduate School of the University. - V. S.

7897. Shaw, Herman. (1) Report on Preliminary Visit of Inyaminga, dated September 1936. (2) Geophysical Survey of the Southeastern Area, Report dated February 1937. (3) Supplementary Notes on the Gradiometer Survey at Inyaminga During 1934, dated March 1937. (All deposited in typewritten form in the library of the Geological Survey, Washington, D. C.)

The author analyzes the evidence gathered by surveys in the Inyaminga (Inhaminga) Petroleum Concession of the Mozambique Co., Portuguese East Africa, and makes recommendations for further exploration. (1) In the first report, former exploratory data are reviewed, and the Southeastern Area of the concession is found suitable for gravitational and seismic surveys; magnetic trial traverses are also advised. (2) In the second report, the results of the magnetic and seismic work made in the Southeastern Area in 1936 are examined. Recommendations are made for a magnetic survey of the previously discovered anomaly and of other locations, as well as for a gravimetric survey of the anomaly. (3) In the Notes, the previous gradiometer evidence of O. Weiss on the Inyaminga structure (see No. 7800 of this issue) is examined, and expanded gravimetric exploration of this structure is advised, in combination with a magnetic survey. - V. S.

7898. Shepherd, G. F., and Atwater, G. I. Geologic Use of Drilling-Time Data. Oil Weekly, Houston, Tex., vol. 114, 1944, No. 5, pp. 17-24, No. 6, pp. 38-46.

Drilling time can be used as an aid in coring, sample logging, and determining permeable streaks in limestones. Experience has shown that lithology is the controlling factor in the rate of penetration; mud characteristics, rotary speed, drilling weight, type of bit, and other variables have a slight effect on the curve of relative speed. The more fully automatized the recording is, the better will be the log. The author has studied the drilling of 28 wells made with a semi-automatic recorder; total footage exceeded 138,000 feet. He discusses subsurface control from drilling time, correlation between drilling-time logs, control of directional holes, drilling time applied to coring, working out completion programs, determination of sample lag, measurement problems, hypothetical electric-log construction, and the limitations of drilling-time logs. Samples of logs illustrate the text. - V. S.

7899. Stetson, H. C. Oceanography. Annual Report of the Board of Regents of the Smithsonian Institution, 1943; Washington, D. C., 1944, pp. 219-244.

In discussing the progress of oceanography the author dwells on submarine geology and marine surveying. Magnetic, gravimetric, and seismic exploration and bottom sampling are briefly outlined. A bibliography is appended. - V. S.

7900. Turechek, G. F. More About Powder and Ballistics, Parts I-III. Tomorrow's Tools - Today, Los Angeles, Calif., vol. 10, 1944, No. 2, pp. 12-13, 34, No. 3, pp. 14-15, 34, No. 4, p. 29.

This series of articles discusses briefly powder and interior ballistics in connection with gun-perforating operations in cased wells. Part I deals with powder grain-sizes, their application, and general powder specifications. Part II discusses the composition and characteristics of powders, their burning time, and the gun. Part II treats of the combined functioning of various elements in a gun-perforating operation and touches briefly on interior ballistics. - V. S.

7901. Weller, J. M. Petroleum Possibilities of Red Basin of Szechuan Province, China. Bull. Am. Ass. Petrol. Geol., Tulsa, Okla., vol. 28, No. 10, 1944, pp. 1430-1439.

The Red Basin of Szechuan Province contains a thick series of Mesozoic and possibly Tertiary redbeds which overlies Triassic marine limestone and a largely unknown succession of Paleozoic formations. Many anticlinal folds are known, and oil is present in small amounts at several seepages and in numerous wells drilled for brine. Prospects for production from the "Red Beds" do not appear to be good. The Triassic limestone does not contain oil in commercial quantities on one well formed anticline, but it has been tested at only one other locality. Possibilities of the underlying Paleozoic beds, particularly the Permian which probably occurs throughout the basin, are worthy of careful consideration. - Author's abs.

7902. Yacimientos Petroliferos Fiscales, Direccion General (Argentina). Memoria correspondiente al ano 1942 (Annual Report of the Argentine Administration of Government Oil Fields for 1942). Buenos Aires, Guillermo Kraft Ltda, 1943, pp. 25-31.

A section of this report is devoted to geophysical exploration. This work was carried out during 1942 in the Argentine provinces of Cordoba, Mendoze, Salta, San Juan, Chaco, Chubut, Santa Cruz, Neuquen, and Rio Negro. As in previous years, gravitational and magnetic methods were used for broad surveying, while the seismic method was employed for more detailed investigation. The work is described by provinces; statistics of explored areas are given, maps are appended, and comparisons are made with the data for 1941. - V. S.

9. NEW PUBLICATIONS

7903. Beringer, C. C. Geologisches Wörterbuch (Geological Dictionary), 2d ed. Stuttgart, F. Enke Verlag, 1943, 154 pp. Price, 6.60 RM.

This German dictionary gives definitions and explanations of terms in the field of geology, paleontology, mineralogy, mining, soil science, etc. In many cases the explanations are comprehensive and illustrated by examples. The second edition has been enlarged by the addition of new terms. - V. S.

7904. Engeln, O. D. von. Geomorphology, Systematic and Regional. New York, Macmillan Co., 655 pp., 380 illustrations. Price, $4.50.

Information is presented on land forms useful in problems dealing with ore and oil deposits, nature of bedrock, depth of soil, rock layers, etc. The test covers relief features, geomorphic units, geomorphic cycles in different locations, the peneplain concept, rock strength, weathering, mass translocations, dome and fold structures, faulting, land forms from volcanicity, etc. - V. S.

7905. Mathematical Tables Project, Work Projects Administration of the Federal Works Agency, U.S.A. Tables of Lagrangian Interpolation Coefficients. Conducted under the Sponsorship of the National Bureau of Standards; A. N. Lowman, Technical Director. New York, Columbia University Press, 1944, 392 pp. Price $5.00.

In mathematical solutions of problems it is often necessary to approximate complicated functions by polynomials or trigonometric sums. The principles of such approximation are embodied in the theory of polynomial or trigonometric interpolation, of which the Lagrangian interpolation formula is a fundamental expression. The present volume extends the few existing tables of Lagrangian interpolation coefficients by giving the entries at smaller intervals of the argument and by making adequate provisions for interpolation near the beginning and the end of a table. The tables cover (1) Lagrangian Interpolation Coefficients, and (2) Lagrangian Integration Polynomials and Coefficients. Introductory remarks deal with properties of Lagrangian interpolants, errors in interpolation, relation between Lagrangian interpolants and the coefficients of difference formulas, and numerical integration. A bibliography is included. - V. S.

7906. Reich, H., and Zwerger, R. von, Editors. Taschenbuch der Angewandten Geophysik (Pocketbook of Applied Geophysics). Leipzig, Becker & Erler, 1943.

This pocketbook presents the information required by geophysicists in practical work. At the beginning are given mathematical and physical tables and formulas. There follows a comprehensive treatment of the gravimetric, seismic, magnetic, electric, radioactive, and thermal methods. Theoretical onsiderations are avoided; instead, a bibliography of related literature s provided. A detailed subject index facilitates the use of the information. V. S.

10. PATENTS

907. Well Surveying Method and Apparatus; R. E. Fearon, Tulsa, Okla., assignor to Well Surveys, Inc., Tulsa, Okla., a corporation of Delaware. U. S. Patent 2,351,028, issued June 13, 1944.

A method of determining the nature of substances that comprises deriving rom individual quanta of gamma rays emanating therefrom an ionization prorotional to the energy in each quantum, separately converting the ionization aused by each quantum into an electrical impulse, amplifying, and recording he magnitude of the current corresponding to each quantum, separately. - laims allowed, 6.

908. Seismic Prospecting; N. H. Ricker, Tulsa, Okla., assignor to Standard Oil Development Co., a corporation of Delaware. U. S. Patent 2,351,456, issued June 13, 1944.

In seismic prospecting in which seismic waves are introduced into the round at a selected point, received at other points selected in the path f said waves from substrata and converted into electrical impulses, the teps which comprise amplifying the different frequencies of said impulses o a different degree proportional to the absorption of said frequencies y the earth while maintaining the phase relationship between said frequencies, nd recording the amplified impulses. - Claims allowed, 5.

7909. Method of Seismic Prospecting; R. L. Lay, B. H. Treybig, Jr., and L. M. Hubby, Houston, Tex., assignors to Texaco Development Corporation, New York, N. Y., a corporation of Delaware. U. S. Patent 2,351,524, issued June 13, 1944.

In the process of seismic exploration in which the firing of a charge f explosive placed below the surface of a body of water is used to generate eismic waves, the method of preventing the occurrence of secondary P waves hen the charge is exploded which comprises correlating the amount of the harge, the strength of the explosive, and the depth of the charge in the ody of water so that the explosive force of the charge when fired is just ufficient to blow out the water above the exploding charge, placing the harge of explosive at the predetermined depth, and firing the charge to enerate seismic waves. - Claims allowed, 3.

7910. Gravity Meter; Anton Graf, Berlin-Steglitz, Germany; vested in the Alien Property Custodian. U. S. Patent 2,351,955, issued June 20, 1944.

A gravity meter comprising in combination a casing for the meter, a mass mounted within the meter casing for vertical displacement, spring means balancing the gravity force of said mass, an optic-electric cell system for converting light variations into electric values, said system including two cell units, a first light source emitting light towards one cell unit, a second light source emitting light towards the other cell unit, a first diaphragm arranged in each of the light paths, a second diaphragm arranged in each of the light paths and located in front of said first diaphragm, each diaphragm having apertures which permit light from the source associated therewith to pass therethrough towards the cell unit associated with the diaphragm, means for mounting said first diaphragms whereby they are adjustable in a substantially vertical direction and are adjustably turnable about a substantially horizontal axis, said second diaphragms being arranged to be displaced with said mass in such manner that upon a displacement of the mass the quantity of light reaching one of the cell units increases while the quantity of light reaching the other cell unit decreases, indicating means operatively connected to said cell system to indicate the difference between the measuring values of said two units, said two cell units being arranged back to back in spaced relation in the center of the meter casing, said meter casing being provided with openings, one for each light source, a separate lamp casing arranged outside of the meter casing opposite each opening in the meter casing the means for mounting one of said light sources in each lamp casing whereby the light source is substantially vertically displaceable relative to the first diaphragm associated therewith. - Claims allowed, 5.

7911. Thermal Well-Logging; L. W. Blau and G. E. Cannon, Houston, Tex., assignors to Standard Oil Development Co., a corporation of Delaware. U. S. Patent 2,352,247, issued June 27, 1944.

A method for determining the nature of substrata traversed by a borehole filled with a fluid which comprises measuring the horizontal temperature gradient between the center and the wall of the borehole at successive points along the borehole. - Claims allowed, 3.

7912. Well Logging; Gerhard Herzog, Houston, Tex., assignor to The Texas Co., New York, N. Y., a corporation of Delaware. U. S. Patent 2,352,433, issued June 27, 1944.

A method of determining the stratigraphy of the formations adjacent a well bore, which comprises inserting into a well bore an instrument adapted for use in the determination of the characteristics of the surrounding formations, passing the instrument through the formations of which information is desired while continuously recording the characteristics thereof, reversing the motion of the instrument, repassing the instrument through the said formations while continuously recording the characteristics thereof, and subtracting one of the two records obtained from the other record. - Claims allowed, 3.

913. Seismic Surveying; J. O. Parr, Jr., San Antonio, Tex., assignor to Olive S. Petty, San Antonio, Tex. U. S. Patent 2,352,494, issued June 27, 1944.

An amplifying system for amplifying a train of waves extending over period of several seconds and in which the first part of the train has general amplitude level several times greater than that of the remainder nd in which the general level of the remainder gradually decreases, the ombination with a seismometer for converting incoming seismic energy into lectrical wave form signals, and means for amplifying and recording such ignals, said amplifying means including at least one thermionic valve mplifier, of a thermionic control valve for applying to a control grid f said valve amplifier a more negative bias in response to increase in mplitude of incoming energy above a predetermined amplitude, means norally biasing the grid of said control valve beyond cut-off, means applying o the grid of said control valve a bias derived from the incoming energy f such value as to render the grid potential less negative than said normal ias when said energy exceeds said predetermined amplitude, and means utomatically operable before the major portion of the wave train has been eceived to gradually render said normal bias more negative toward the end f the period of arrival of the train to effect a corresponding increase n said predetermined amplitude independent of subsequent incoming energy aid last named means acting over the major portion of the period of arrival f the train. - Claims allowed, 4.

914. Seismograph Amplification Gain Control; C. H. Fay, Houston, Tex., assignor to Shell Development Co., San Francisco, Calif., a corporation of Delaware. U. S. Patent 2,352,825, issued July 4, 1944.

In a method of seismic exploration, the steps of generating electric mpulses, amplifying in parallel each of said impulses throughout symmetrical ortions of its cycle, combining the symmetrically amplified impulses, ectifying said impulses, causing a potential variation between an initial nd a final value throughout a period of time, controlling the rate of hange of said potential variation as a function of said rectified impulses, nd controlling the parallel amplification of said impulses by symmetrically pplying thereto said controlled potential variation. - Claims allowed, 2.

915. Seismic Surveying; J. F. Tolk, San Antonio, Tex., assignor to O. S. Petty, San Antonio, Tex. U. S. Patent 2, 352,869, issued July 4, 1944.

In a method of seismic surveying which involves firing an explosive harge to create seismic waves in the earth, detecting said waves at a lurality of remote points, converting the same to separate electrical ave form signals, and amplifying and recording such signals, the steps hich comprise causing the electrical wave form signals from each such oint to flow through two separate paths, filtering the signals in one nly of such paths to emphasize a restricted band of frequencies, and eparately and simultaneously recording the signals flowing in both paths. - laims allowed, 9.

7916. Radiological Method of Logging Wells; M. M. Albertson, Houston, Tex., assignor to Shell Development Co., San Francisco, Calif., a corporation of Delaware.- U. S. Patent 2,352,993, issued July 4, 1944.

In a method for logging boreholes by means of a detector responsive to radio-active phenomena, the steps of introducing into a borehole and forcing into a formation zone adjacent the borehole a liquid comprising a radioactive tracer material, subsequently withdrawing said liquid from the borehole proper, lowering said detector into the borehole, and indicating the radioactive effects to which said detector is subjected by reason of the presence of a portion of said material in said formation zone. - Claims allowed, 12.

7917. Seismic Exploration Method; Eugen Merten and J. P. Woods, Houston, Tex., assignors to Shell Development Co., San Francisco, Calif., a corporation of Delaware. U. S. Patent 2,353,484, issued July 11, 1944.

In a method of geophysical exploration wherein seismic waves are translated into electric impulses and recorded, the steps of generating said seismic waves by confining a uniformly distributed explosive charge over a substantially horizontal ground area, the measurement of said area in at least one horizontal direction being at least one-tenth of the vertical distance between said area and the nearest reflecting underground layer, and exploding said charge. - Claims allowed, 2.

7918. Geophysical Prospecting; Bruno Pontecorvo and Gilbert Swift, Tulsa, Okla., assignors to Well Surveys, Inc., Tulsa, Okla., a corporation of Delaware. U. S. Patent 2,353,619, issued July 11, 1944.

Apparatus useful in geophysical prospecting within a well bore that comprises a radiation detector, means for suspending said detector within a well bore, a radiation source, and means for freely suspending said source within the well bore in spaced relationship relative to the detector, said means having sufficient flexibility that the detector can move within the bore hole into close proximity to said source. - Claims allowed, 12.

7919. Contractor-Expander for Electric Seismographs; J. P. Minton, Dallas, Tex., assignor, by mesne assignments, to Socony-Vacuum Oil Co., Inc., New York, N. Y., a corporation of New York. U. S. Patent 2,354,420, issued July 25, 1944.

In an electric seismograph having a vacuum tube amplifier having at least two gain-control grids, a geophone connected to the input of said amplifier, a recording galvanometer connected to the output of said amplifier, means operable upon production of seismic waves for generating a signal, and means actuated by the signal for gradually and concurrently varying the grid potential in opposite directions on at least two grids in at least one of the tubes in the vacuum tube amplifier to effect a orresponding contraction and thereafter an expansion in amplification by he amplifier at such a rate that all phases of the record made by said ecording galvanometer are of usable amplitude. - Claims allowed, 9.

920. Electrical prospecting; Gary Muffly, Penn Township, Allegheny County, Pa., assignor to Gulf Research & Development Co., Pittsburgh, Pa., a corporation of Delaware. U. S. Patent 2,354,535, issued July 25, 1944.

A method of locating electrically nonlinear earth stratum interfaces omprising passing alternating current of a single frequency through the arth, exploring for at least one harmonic of said frequency generated by assage of said current through an interface and selectively detecting aid harmonic. Furthermore, a method of locating a stratum interface aving nonlinear electrical impedance characteristics comprising passing wo alternating currents of different frequency through the earth, exploring for at least one side band resulting from modulation of one of aid frequencies by the other in passing through an interface and selectively etecting said side band. - Claims allowed, 22.

921. Seismic Prospecting; N. H. Ricker, Tulsa, Okla., assignor to Standard Oil Development Co., a corporation of Delaware. U. S. Patent 2,354,548, issued July 25, 1944.

A method for the investigation of earth substrata which comprises establishing a disturbance point in the area to be investigated, creating a eismic disturbance at the disturbance point, establishing a reception point or seismic waves at each of a plurality of spaced points removed from he disturbance point but sufficiently close to this point to receive energy rom said disturbance, and receiving at each reception point and recording s a function of time, shear waves generated by the reflection of a compressional wave from reflecting layers in said earth substrata. - Claims llowed, 10.

7922. Seismic Surveying; W. O. Bazhaw and J. O. Parr, Jr., San Antonio, Tex., assignors to Olive S. Petty, San Antonio, Tex. U. S. Patent 2,354,659, issued August 1, 1944.

A method of geophysical exploration for use in the location of subterranean porous formations permeated by fluid, comprising the steps of propagating seismic waves beneath spaced points in the vicinity of the earth's surface, whereby the fluid is subjected to pressure and caused to flow ithin the porous formation, detecting the potential difference developed etween such points by electric current flow resulting from such fluid low and amplifying and recording the potential difference. - Claims allowed, 2.

7923. Gravity Meter; D. H. Clewell and H. A. Maeder, Dallas, Tex., assignors to Socony-Vacuum Oil Co., Inc., New York, N. Y., a corporation of New Yord. U. S. Patent 2,355,421, issued Agust 8, 1944.

A force measuring device comprising in combination, a housing, a support within said housing secured thereto, a mass, means for pivotally securing the mass to the support for rotation in a vertical plane, means secured to the mass for elastically balancing the effect of gravitational forces on said mass, means for securing said elastically balancing means to the support, said means comprising a pair of slides, common means for adjusting one of said slides and locking it in adjusted position, and means for observing the position of the mass relative to the housing and support, whereby changes in the position of the mass due to the action of gravitational force thereon can be measured. - Claims allowed, 17.

7924. Seismic Prospecting; J. A. Sharpe, Tulsa, Okla., assignor to Stanolind Oil & Gas Co., Tulsa, Okla., a corporation of Delaware. U. S. Patent 2,355,826, issued August 15, 1944.

Apparatus for the determination of a transmission characteristic of the weathered zone below a seismic recording station comprising a source of seismic waves positioned at one boundary of said weathered zone, a seismometer positioned at the other boundary of said weathered zone and approximately vertically located with respect to said source of seismic waves, means determining a characteristic of said seismic waves at said source, and means for comparing said characteristic with the corresponding characteristic of the output from said seismometer. - Claims allowed, 5.

7925. Method of and Apparatus for Firing Gun Perforators; R. M. Otis, Pasadena, Calif., assignor to Lane-Wells Co., Los Angeles, Calif., a corporation of Delaware. U. S. Patent 2,356,082, issued August 15, 1944.

A method of firing a gun perforator in a well, characterized by: Generating adjacent the top of said well an elastic vibration; acoustically transmitting said vibration adjacent said gun perforator; and initiating operation of said gun perforator in response to said picked-up vibration. - Claims allowed, 18.

7926. Retrievable Gun Perforator; E. F. Raymond, Los Angeles, Calif. U. S. Patent 2,356,431, issued August 22, 1944.

A retrievable gun perforator for use in wells, comprising a body movable downwardly along a cable lowered in the well in advance of the perforator, a gun unit within the body, and means for interconnecting the body and cable at different locations along the cable to permit removal of the perforator on the cable from different depths at which the perforator may become lodged in the well. - Claims allowed, 14.

7927. Method and Apparatus for Conducting Different Investigations Simultaneously in Boreholes; H. G. Doll, Paris, France, assignor, by mesne assignments, to Schlumberger Well Surveying Corporation, Houston, Tex., a corporation of Delaware. U. S. Patent 2,357, 177, issued August 29, 1944.

A method of simultaneously investigating electrical characteristics
t different depths of investigation of the formations surrounding a bore-
ole, comprising the steps of simultaneously generating in the borehole
plurality of alternating currents of different frequencies, passing all
f said generated currents through the adjoining formations by applying
hem to the formations in such a way as to be differently affected by
lectrical characteristics of the formations at different depths of investi-
gation, obtaining electrical values from said respective current resulting
rom their passage through said formations, which values are functions of
he electrical characteristics of the formations at different depths of
nvestigation, respectively, combining said electrical values to a single
lectrical circuit, and obtaining therefrom at the surface of the earth,
eparate simultaneous indications of said electrical values. - Claims
llowed, 13.

7928. Method and Apparatus for Investigating Boreholes; H. G. Doll, Paris, France, assignor, by mesne assignments, to Schlumberger Well Surveying Corporation, Houston, Tex., a corporation of Delaware. U. S. Patent 2,357,178, issued August 29, 1944.

A method of simultaneously investigating electrical characteristics
t different depths of investigation of the formations surrounding a bore
ole, comprising the steps of generating electrical current of given
haracter at the surface of th earth, transmitting said current
f given character through a single electrical circuit to a given location
in the bore hole, converting said current of given character at said lo-
ation to a plurality of alternating currents of different frequencies
hich are different in character from said current of given character,
imultaneously passing all of said converted alternating currents of
aid different frequencies through the adjoining formations by applying
hem to the formations in such a way as to be differently affected by
lectrical characteristics of the formations at different depths of investi-
gation, obtaining electrical values from said respective currents of dif-
erent frequencies resulting from their passage through said formations,
hich values are functions of the electrical characteristics of the for-
ations at different depths of investigation, respectively, combining said
lectrical values, applying said combined electrical values to said single
lectrical circuit, and obtaining therefrom at the surface of the earth
eparate simultaneous indications of said electrical values. - Claims
llowed, 11.

7929. Inductive-Capacitive Electrical Logging; M. C. Bowsky, Houston, Tex., assignor to Lane-Wells Co., Los Angeles, Calif., a corporation of Delaware. U. S. Patent 2,358,441, issued September 19, 1944.

A method of electrically logging well bores characterized by: establishing an alternating current field in the formation traversed by a well bore; establishing a probe circuit for electrically sampling said alternating current field; commutating the alternating current in said probe circuit in a manner to render the reversal of the probe current by commutation approximately 90 electrical degrees out of phase with respect to the alternating current potential as applied to the formation; moving the pick-up portion of the probe circuit to a different location and measuring algebraically the resultant voltage, to detect shifting of the phase of the alternating current in the formation due to inductive or capacitive characteristics of the formation at said different location. - Claims allowed, 3.

7930. Gamma Ray Well Logging; L. G. Howell, Houston, Tex., assignor to Standard Oil Development Co., a corporation of Delaware. U. S. Patent 2,358,574, issued September 19, 1944.

A method for producing a log of the gamma-ray activity of formations penetrated by a borehole which comprises moving along the borehole an ionization chamber capable of generating current in response to gamma ray bombardment, of a size proportional to the gamma-ray intensity, converting said current into a pulsating current of an amplitude proportional to the gamma ray intensity and of a selected frequency wholly independent of gamma-ray intensity, transmitting said pulsating current to the surface, amplifying it, and recording it. - Claims allowed, 18.

7931. Method of Determining the Porosity and Location of Permeable Formations in Oil Wells; C. F. Teichmann, Mount Vernon, N. Y., assignor to Texaco Development Corporation, New York, N. Y., a corporation of Delaware. U. S. Patent 2,358,945, issued September 26, 1944.

The method of determining the presence and location of permeable formations surrounding a borehole which comprises treating the filter cake deposited on the walls of the hole to render said filter cake permeable, circulating a solution of a radioactive substance into said hole, applying pressure to the solution to force it through the filter cake and into permeable formations surrounding the hole, removing from the hole the solution not absorbed by the formations and then passing an instrument through the hole to detect the radioactivity of the surrounding formations. - Claims allowed, 8.

7932. Method of Well Core Investigation; E. D. Lynton, Glendale, Calif., assignor to Standard Oil Co. of California, San Francisco, Calif., a corporation of Delaware. U. S. Patnet 2,359,135, issued September 26, 1944.

A method of investigating well cores, including determining indications
stratification on the surface of a well core comprising the steps of
ewing said core under light of a wave length which is outside the visible
pectrum and which will cause one or more stratified and segregated com-
nents of said core to become visible, and correlating said stratification
ndication with the orientation of said core. - Claims allowed, 6.

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GEOPHYSICAL ABSTRACTS 121

APRIL - JUNE 1945

BY

W. AYVAZOGLOU AND V. SKITSKY

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UNITED STATES DEPARTMENT OF THE INTERIOR - BUREAU OF MINES

GEOPHYSICAL ABSTRACTS 121
April - June 1945[1]

Compiled by W. Ayvazoglou and V. Skitsky[2]

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FOREWORD

Geophysical Abstracts 1 - 86 were issued in mimeographed form by the reau of Mines; Abstracts 87 - 111 were published in bulletins of the Geogical Survey; Abstracts 112 - 120 were issued in mimeographed form by the reau of Mines as Information Circulars 7256, 7257, 7267, 7273, 7285, 7292, 03, 7310, and 7324.

1. GRAVITATIONAL METHODS

33. Ansel, E. A Eine Untersuchung zum Problem der Isostasie (An Investigation Regarding the Problem of Isostasy). Gerlands Beitr. Geophys., Leipzig, vol. 59, 1942, pp. 16-26.

The Bureau of Mines will welcome reprinting of this paper, provided the following footnote acknowledgment is used: "Reprinted from Bureau of Mines Information Circular 7338."

Physical science analytical editor, Bureau of Mines, U. S. Department of the Interior.

Certain deductions are drawn from the isostatic theory regarding the continents and the surfaces covered with water. They are based on simplifying assumptions which serve for calculating the thickness of the earth's crust, pressures under the ocean pole and the continental pole, change of pressure at the boundary between ocean and continent, etc. The computations are indicated and the values given. It is discovered that the pressure existing on the isostatic level under the surfaces covered with water does not equal that under the continents. Moreover, at the lower limit of the earth's crust, the pressure under continents increases gradually from the pole to the ocean, undergoes an abrupt change at this boundary, and then increases gradually again under the ocean-covered ground until the ocean pole. - V. S.

7934. Ballarin, Silvio. Errori medí di diciotto determinazioni di gravità relativa eseguite in Sicilia nel 1929, e notizie sull'andamento della campagna (The Average Errors of 18 Measurements of Relative Gravity Made In Sicily in 1929, and Remarks Regarding the Field Survey). Boll. Geodet., vol. 2, 1942, pp. 151-155

In 1929 the Instituto Geografico Militare, Italy, organized a survey of relative gravity in Sicily. The instruments consisted of the double-pendulum apparatus of Mioni, the thermometer of Woytacek, the barometer of Solmoiraghi, the psychrometer of Assmann, and the chronometer of Nardin. Chronometric readings were checked against international rhythmic signals from Bordeau and Rugby. For observation, two procedures were used: (a) All the pendulums were made to oscillate simultaneously four times, and measurements were taken of the time intervals separating 60 successive coincidences; and (b) observation also were conducted at equal intervals as measured on the chronometer. In th calculations, the constant σ of the pendulum's staff was computed for each station by the method of Borrass. The results were tested for different elements of error, accidental and systematic, referred to one oscillation or to a series, and to one station or to different stations. The values obtaine are given. The main part of the accidental error is found to be due to an incorrect position of the pendulums caused by imperfections of the supporting surfaces. The average value of the error in the determination of the difference of gravity between the basic station and any field station is ± 0.0035 gal. - V. S.

7935. Dubiago, A. D. Remarks on Estimating the Precision of Observations Made with Variometers (in Russian). Bull. Acad. Sci. U.R.S.S. (Izvestiia), Sér. Géogr. Géophys., Moscow, vol. 8, No. 1, 1944, pp. 18-2

Measurements made with gravitational variometers give values of the second derivatives of the potential of gravity. Such gradients serve, with due corrections, for preparing isogam maps. The author examines the precisio of variometer observations with a view to determining the accuracy of the maps. The average errors of gravity gradients traceable solely to the performances of the observer and of the instrument are approached in the light of the total average quadratic errors of gradients produced by all the causes of error involved. The latter errors are expressed mathematically in terms of the discrepancies discovered between anomaly values at the closure of separate polygons in a variometer survey; both the completely and incompletely closed polygons are considered. On the basis of these discrepancies, new formulas are obtained for the accuracy of variometer observations; their mathematical derivation is presented. In a companion study the author has calculated the accuracy of integration of gravity gradients. - V. S.

7936. Eby, J. B. Geophysical History of South Houston Salt Dome and Oil Field, Harris County, Tex. Bull. Am. Assoc. Petrol. Geol., Tulsa, Okla., vol. 29, No. 2, 1945, pp. 210-214.

The South Houston salt dome was discovered by the Stanolind Oil & Gas Co., by use of the torsion balance, in May and June, 1934. The structure was confirmed a few weeks later by reflection seismograph, by the Independent Exploration Co., under contract to the Stanolind. The original gravity anomaly was partly obscured by the influence of a large regional gravity-minimum area, commonly referred to as the "Pearland regional minimum." The discovery of the South Houston salt dome is unique in respect to the accuracy with which the domal uplift was localized and the very limited amount of work necessary to find it. Subsequent drilling confirmed the salt dome, and oil was discovered in commercial quantities immediately thereafter. - Author's abs.

7937. Erola, V. On the Structure of the Earth's Crust in the Neighbourhood of the Ferghana Basin. Ann. Acad. Sci. Fennicae, Helsingfors, A 3, vol. 3, 1941, pp. 1-77.

An isostatic study was made of the Ferghana Basin, Central Asia. From the 185 initial gravity measurements, 162 reliable values were selected for the basin proper and its neighbourhood. Anomalies were calculated according to the international formula for gravity. The reductions were made for the free-air anomalies, Bouguer anomalies, isostatic anomalies (after Pratt-Hayford and Airy-Heiskanen), and regional isostatic anomalies (after Vening-Meinesz). The methods and reliabilities of the computations are clarified by examples. The results are presented together with gravity profiles and maps. The distribution of the gravity values shows a marked minimum in the Ferghana basin. The center of this minimum has values ranging, according to the kind of reduction applied, from - 100 to - 250 mlg. The minimum can be explained by the assumption that the earth's crust is thicker here by several kilometers than is necessitated by isostasy. - V. S.

7938. Haalck, H. Ergebnisse der vollständigen Berechnung des gravimetrischen Störungsfeldes im Gebiet von Gifhorn (Results of a Complete Calculation of the Gravity Anomaly in the Region of Gifhorn). Beitr. angew. Geophys., Leipzig, vol. 9, 1942, pp. 290-302

The author advances a new method for the calculation of gravity disturbances. This method serves to compute, from torsion-balance gradients and curvature values, the vertical gravity-gradient W and leads to a complete determination of a disturbance field. An application was made in the case of the gravity anomaly at Gifhorn. The initial observations are indicated. There are also given gradients and curvature values, isanomalies of the intensity of gravity and of the vertical gradient, vectors of the vertical anomaly, and lines of equal deviation of the niveau-surface from a level. As a result of calculations, the total gradient is found to be about 90 Eötvös units; the maximal effect of the salt mass, about 80 Eötvös; that of deeper masses, about 40 Eötvös. Thus, the salt dome is clearly delineated. - V. S.

7939. Hammer, Sigmund. Estimating Ore Masses in Gravity Prospecting. Geophysics, Menasha, Wis., vol. 10, No. 1, 1945, pp. 50-62.

The interpretation of the results of gravitational prospecting surveys is considered, from a theoretical point of view, in terms of the magnitude of the causative mass as distinct from the conventional interpretation in terms of the mass distribution (size, shape and depth). A general proof is given, based on Gauss' theorem in potential theory, that the former problem is unique, and the uniqueness is illustrated by an analytical example which also serves to demonstrate the well-known lack of uniqueness of the latter problem.

Practical formulae are presented for estimating the total mass directly from the gravity data and the precision of the mass estimate is considered. The method is applied to a practical gravimeter survey over a known chromite ore body and the estimated mass is found to be in excellent agreement with estimates from core drilling. - Author's abs.

7940. Hammer, Sigmund, Nettleton, L. L., and Hastings, W. K. Gravimeter Prospecting For Chromite in Cuba. Geophysics, Menasha, Wis., vol. 10, No. 1, 1945, pp. 34-49.

As a contribution to the War Production Board's program of exploration for strategic minerals and under an arrangement with the Bethlehem Steel Co., Gulf Research & Development Co., in early 1942, made gravimeter surveys in the chromite-bearing Camaguey district, Cuba. One large chromite deposit, under and between two adjacent gravity anomalies, which has been outlined to date by core drilling based on the results of this work, constitutes a substantial addition to the chrome ore reserves of the district.

Chrome ore bodies occur in or are associated with igneous rocks. Extensive density determinations of selected rock samples revealed that the chrome ore has a positive density contrast of about 1.5 with respect to the serpentine rock in which it occurs but also that local occurrences of various other types of igneous rocks, as well as weathered surface material, cause appreciable density contrasts.

The technical aspects of the gravimeter field work are discussed. Many ravity anomalies were found; subsequent geological field work and a systetic program of test drilling proves the anomalies to arise from a variety causes. Typical examples of gravity anomalies due to chromite deposits d to various igneous rock masses are presented. The paper concludes with ief comments on the economic significance of the work. - Authors' abs.

41. Kovrigina, V. I., and Bulanzhe, Iu. D. A New Determination of Thermal Coefficients of the Pendulums of Apparatus No. 136608 belonging to the Cambridge Society (in Russian). Akademiia Nauk S.S.S.R., Trudy Seismologicheskogo Instituta, Moscow, No. 106, 1941, pp. 96-99.

Invar pendulums have variable thermal coefficients. Measurements had en made of these coefficients in 1936-37 for the three pendulums of paratus 136608 belonging to the Cambridge Society. They showed marked stematic variations. In the winter of 1937-38 new determinations of thermal efficients were undertaken for the same apparatus. This investigation was rried out in the thermal chamber of the Gravimetric Laboratory of the ismological Institute in Moscow. The method and the results are described. stematic errors again were detected in the measurements. The conclusion drawn that invar pendulums require basic determinations of thermal efficients not less than once per year. - V. S.

42. McGuckin, G. M. History of the Geophysical Exploration of the Cameron Meadows Dome, Cameron Parish, La. Geophysics, Menasha, Wis., vol. 10, No. 1, 1945, pp. 1-16.

In order to demonstrate the growth of our knowledge of a typical Gulf ast salt dome concurrently with development of the science of geophysics, e successive application of various techniques to the exploration of the meron Meadows dome is described and illustrated. These methods were: chanical refraction seismograph (1926); torsion balance (1927); electrical fraction seismograph (1928-29); early correlation reflection seismograph 929); dip reflection seismograph (1933); special salt profiling refraction ismograph (1942); continuous correlation reflection seismograph (1942); avity meter (1943). - Author's abs.

43. Solaini, L. Determinazioni di gravita lungo la linea di livellazione di alta precisione Genova - Isola del Cantone (Gravity Determinations Along the Line of a Highly Precise Topographic Survey Between Genoa and Isola del Cantone). Riv. Geomineraria, vol. 3, Nos. 3/4, 1942, p. 16.

A topographic survey of great precision was carried out between Genoa d Isola del Cantone, Italy. As a part of this survey, the Military ographic Institute has made, through Lerici's Center of Geomineral ospecting, a number of gravimetric measurements between these points. The ing gravimeter was used; the average error for a station amounted ± 0.18 l. The instrument was calibrated by means of comparisons with the data tained in the same locations by a gravimeter of a different construction d by a pendulum. - V. S.

7944. Tamura, M. On the Newly Designed Driving Mechanism of Free Pendulum. Jour. Meteorol. Soc. Jap., Tokyo, vol. 17, 1939, pp. 325-331.

In this mechanism the gear and escapement movement is avoided. At every swing of the pendulum, it receives impulse by a falling weight which has been raised by means of an electromagnet. That is, in the same direction of the pendulum, the top of suspension chop is carried a short distance (2 or 3 microns), immediately before the pendulum has crossed the line of center. The pendulum is entirely free, and the principal part of the mechanism is free from friction; therefore it does not need any supply of oil. The pendulum is suspended in an airtight case placed in a room maintained at constant temperature, so that it is subjected to low air pressure. Therefore the period of the pendulum is rendered free from the effect of the disturbing influences due to fluctuation of air pressure, temperature, escapement friction, motive force, etc. - Author's abs.

7945. Tovchigrechko, S. S. The Calculation of the Isostatic Reduction of Gravity for Gravimetric Stations in the Crimea and the Black Sea (in Russian). Tsentral'nyi Nauchno-Issledovatel'skii Institut Geodezii, Aeros'emki i Kartografii GUGK pri SNK SSSR, Sbornik 7, Issledovaniia po Gravimetrii, Moscow, 1941, pp. 81-86.

A tentative calculation is presented of isostatic reductions of gravity for the gravimetric stations in the Crimea and the Black Sea. The tables of O. Meissner; Tabellen zur isostatischen Reduktion der Schwerkraft, based on Pratt's hypothesis were used (see Astronomische Nachrichten, vol. 206, 1918). In all, 15 stations in the Crimea and 4 stations in the Black Sea were covered. The source material, methods of computation, and underlying formulas are indicated; a tabulation of data on the Bouguer, isostatic and free-air anomalies is given. Some maps are included. The tentative conclusion is advanced that there is no isostatic compensation in the Crimean region. - V. S.

7946. Vening-Meinesz, F. A. The Earth's Crust under the Ocean (in Dutch). T. Nederl. Aardrijks. Genootsch. Amsterdam, ser. 2, vol. 58, 1941, pp. 1033-1038.

The material collected during gravity observations at sea has been subjected to recalculation. This was done by the use of new tables for local and regional isostatic reductions computed on the basis of Airy's system. The recalculations are discussed. Certain results are communicated on the gravity anomalies in the earth's crust under the ocean. The abrupt change in anomalies found at the boundary of continents by former reductions is not indicated by the new computations. Instead, the transition to the weak positive anomalies of different ocean basins is gradual. It seems, moreover, that the earth's crust generally thins out toward the ocean at the boundary of a continent by about 16 to 20 km. Such a thickness corresponds to that of the granitic layer, as determined by seismic measurements. It may be concluded, therefore, that the granitic layer underlies only the continents but ot the ocean. Such a hypothesis would give a simple explanation of the equal verage depths of different oceans. The hypothesis is discussed in its fferent aspects. Other results are given. - V. S.

47. Woollard, G. P. Gravity Observations in Northern New England. Trans. Nat. Research Council, Am. Geophys. Union, 1944, pt. II, Washington, D.C., 1944, pp. 254-258.

The writer made a gravity survey in northern New England in 1943. The easurements were carried out with a Humble Oil Co. "X"-type gravity meter. new stations were established at about 6-mile intervals in the region etween Burlington and Rutland, Vt., Nashua and Gorham, N.H., and Freeport, e. The Bouguer anomoly values were plotted on a map. This map revealed two eatures continuous from southern to northern New England. One is the area haracterized by very low gravity values and stretching along the Hudson alley and Lake Champlain. The other is the parallel area of higher gravity alues just east of the New York State line. A study of these areas in onjunction with the corresponding elevation profiles shows unique gravity elations. The gravity low along the Hudson Valley apparently indicates a ubcrustal "root" of a material of lower density; this low is not confined to ny type of surface lithology. On the other hand, the gravity high along the reen Mountains has no "root" beneath these mountains but high-density rocks otally uncompensated. Such relations seem to indicate that the real causes f the anomalies should be sought in the sub-crustal mass distribution; pparently the gravity high lies along the axis of the Green Mountains by mere oincidence. The author takes the view that the areas of positive and negaive anomalies are areas where the earth's crust thins and thickens. - V. S.

2. MAGNETIC METHODS

48. Allen, C. W. Relation between Magnetic Storms and Solar Activity. Mon. Not. R. Astr. Soc., London, vol. 104, No. 1, 1944, pp. 13-21.

The effects of solar flares and of sunspots on terrestrial magnetic torms have been studied statistically. The magnetic data covered the period 906-42; disturbed days were divided into four classes on the basis of recurence. The solar data comprised days on which large spot groups crossed the entral meridian, and days on which flares and radio fade-outs were observed. orrelations were sought between magnetic disturbances and spot groups, and etween the disturbances and the flares. The results are described by classes. all four classes are grouped together, a featureless curve is obtained, hich shows why no general relation between sunspots and minor recurrent torms has been noticed before. - V. S.

49. Bodle, R. R., and Steenland, N. C. Report on Magnetic Survey and Seismological Observations Made in the Vicinity of Paricutín Volcano, State of Michoacan, Mexico, May - July, 1943. U. S. Coast and Geodetic Survey, Washington, D. C., Special Report Issued for Limited Distribution, 1944, 33 pp.

The recent formation of the new volcano Paricutin in Mexico has offered a rare opportunity for magnetic and seismological studies. (1) A magnetic survey was made by the authors in the summer of 1943 to investigate the effects of volcano formation on the earth's magnetic field. The instruments included magnetometers for base stations and an Askania (Schmidt) vertical intensity magnetic balance for field traverses. The data are tabulated and discussed; relative magnitudes of the vertical intensity are referred to an aerial mosaic map. The results show that the volcano has exerted no significant influence on the earth's magnetic field. However, the available evidence is not sufficient for final conclusions. (2) Preliminary seismological observations were also made for determining the underground sources of the volcano. The equipment was set up at Uruapan, 16 miles from the volcano. It consisted of two Coast and Geodetic Survey vibration meters; short period pendulums of 1 second were used. The observations showed that the ordinary volcanic explosions were not transmitted to Uruapan. It was concluded that the explosions of the volcano were shallow. - V. S.

7950. Evrard, Pierre. Quelques remarques au sujet de la courbe d'anomalie magnétique verticale due à une couche mince inclinée (Some Remarks on the Subject of the Curve of a Vertical Magnetic Anomaly Produced by a Thin, Inclined Layer). Bull. Soc. Roy. Sci. Liège, vol. 11, 1942, pp. 105-119.

The depth and inclination of a thin magnetic layer in the subsurface are calculated on the basis of several preliminary mathematical discussions. (1) A determination is made of the vertical component of a magnetic anomaly produced by a thin magnetized plate. (2) The problems of a perpendicular and an inclined magnetic layer are calculated, with a plotting of the curve of Z-disturbances. (3) Finally, the incidental question of the zero level is discussed, and a geometrical solution is offered. - V. S.

7951. Fanselau, G. Methodische Bemerkungen zu den magnetischen Deklinationsmessungen (Methodological Remarks on Measurements of Magnetic Declination). Gerlands Beitr. Geophys., Leipzig, vol. 59, 1942, pp. 27-31.

A new method is given in which the adjustment of the suspension thread to the torsionless position is avoided. According to the method, a complete determination of declination (with two magnets) may be made by two different adjustments of the torsion head, which are to be chosen almost symmetrically with regard to the corresponding torsionless position, for example, by turning the torsion head about + 40° and - 40° from the original position. The calculation of the torsion correction is explained in detail and demonstrated by example. It is also shown how the relative measurements may be made by using only one magnet and one torsional adjustment, if the ratio γ = D/MH between the torsional constant of the tread and the torsion moment of the horizontal field is determined for itself. - V. Laursen, Zentralblatt Geophys., Meteorol. und Geodäs., vol. 10, No. 5, 1943, p. 242; translated by W. A.

952. Hirayama, M. Some Problems on the Earth-Magnetic and Electric Fields (in Japanese, with an English summary). Jour. Meteorol. Soc. Jap., Tokyo, vol. 17, 1939, pp.43, 435-441.

This is an attempt to explain the observed results of the two components f earth-current and the time variation of the vertical magnetic force btained by rapid registrations at the Toyohara and Kakioka Magnetic Observa- ories. By using - dB/dt = rot E (B = magnetic induction, E = electric force) nd assuming that the vertical electric current at the earth's surface anishes, the author has arrived at the conclusions that the pulsatory scillations recorded at the two observatories are explained to be caused by tanding waves, since there are no phase differences between the two components f earth-current and the time variation of the vertical magnetic force. But hen there are phase differences between them the records can not be explained o be caused by progressive waves. - Y. Kodaira, Zentralbl. Geophys. eteorol. Geodäs., vol. 6, 1940-41, p. 186.

953. Johnston, H. F. American Magnetic Character-Figure, C, Three-Hour-Range Indices, K, and Mean K-Indices, K_A, for July to December, 1944, and Summary for 1944; also Five International Quiet and Disturbed Days for April to June, 1944. Terrestrial Magnetism and Atmospheric Electricity, Baltimore, Md., vol. 49, No. 4, 1944, pp. 261-264, and vol. 50, No. 1, 1945, pp. 47-55.

Tables are given with explanatory test. - V. S.

954. Jones, R. H. B. Geologic Interpretation of Magnetic Exploration on the Mesabi Range, Minnesota (abs.). Econ. Geo., Lancaster, Pa., vol. 40, No. 1, 1945, p. 88; also Skillings' Min. Rev., Duluth, Minn., vol. 33, No. 40, 1945, p. 2.

The Pewabic formation of the Mesabi iron range, Minnesota, has been xplored magnetically. The results of a number of surveys are described, and he magnetic anomalies obtained are correlated with phases of ore development ithin the iron formation, as determined by exploration. It is found that agnetic intensities depend chiefly upon the magnetite content of particular orizon. This content in turn depends upon the degree of oxidation, the ature of the overlying and underlying horizons, and the extent of the racturing, folding, or faulting. - V. S.

955. Kalashnikov, A. G. Regarding the Possible Causes of Magnetic Anomalies in the Region of Moscow (in Russian). Bull. Acad. Sci. U.R.S.S. (Izvestiia), Ser. Geogr. Geophys., Moscow, No. 2, 1943, pp. 83-85.

The causes of magnetic anomalies in the region of Moscow have been ex- lored. (1) Two field axes were drawn through the Boensk borehole in Moscow's utskirts, one along the trend of the anomalies and another perpendicular to it. Then the vertical component of the earth's magnetic field was measured along both these axes, and profiles were plotted. On the other hand, the magnetic susceptibility of rock samples was determined through the depth of the Boensk borehole, and a downward profile was drawn. The profiles are given. (2) The results for the vertical magnetic component showed very wide fluctuations. The range of values on the second field axis attained 1,600 gammas; the maximal positive anomaly, located near the borehole, measured 1,000 gammas. (3) The results for the magnetic susceptibility of rock samples showed magnetically indifferent sedimentary rocks down to a depth of 1,600 meters. But below 1,6500 m. there was found a heterogeneous, strongly magnetic crystalline basement having an average susceptibility between 500 and 3,500 x 10^{-6}. (4) A calculation of the surface effect of the latter magnetic susceptibility gave the same value as had been actually measured near the borehole; the computations are given. It is concluded that the Moscow magnetic anomaly can be explained by its proximity to a crystalline basement possessing high magnetic susceptibility. - V. S.

7956. Observatory. The Great Magnetic Storm of 1941, March 1. London, vol. 64, 1941, pp. 82-86.

The magnetic storm of March 1, 1941, is described according to the records of Abinger Observatory. The total amplitudes were: $3^\circ01'$ in D, 1710 γ in H, and 850 γ in Z. As regards causes, the storm is traced to the strong chromospheric eruption of February 28 and to the large sun spot that passed the central meridian on February 27, as observed at Greenwich. The storm of 1941 and the great storm of September 25, 1909, are compared. - V. S.

7957. Rössinger, M. Die Entstörung magnetischer Beobachtungsräume und erdmagnetischer Observatorien von Gleichstrom-Magnetfeldern der elektrischen Bahnen (Disturbances Produced in Spheres of Magnetic Observations and in Observatories of Terrestrial Magnetism by the D.C. Magnetic Fields of Electrical Railroads). Naturwiss., Berlin, vol. 30, 1942, pp. 753-755.

Cosmic variations and man-made electric arrangements, such as electric railroads, affect the geomagnetic field and influence magnetic observations. A method is described for compensating for these effects and rectifying the observations. It operates within a limited area and counteracts the combined disturbances existing in any components of the terrestrial field. The apparatus is a special variometer switched into the local electric light installation It uses the electric currents accompanying magnetic disturbances and proportional to them for generating magnetic fields equaling and opposing the disturbance fields and canceling their effects. This method was applied to eliminate the effects of electric railroads at the Potsdam Magnetic Observatory, which suffers much from interference. The procedure and instruments employed are described. The observatory's area was successfully freed from disturbance. - V. S.

958. Skillings' Mining Review. Magnetic Surveys for Iron Ore in New Jersey. Duluth, Minn., vol. 33, No. 19, 1944, p. 8

During the year considerable magnetic surveying has been done in the orthern New Jersey iron-ore belt. It resulted in several important disclo- ures of low-grade magnetic iron ore. Deposits of considerable size have been ound at the old Pequest mine east of Belvidere and at other locations near reat Meadows and Mount Bethel, all in Warren County. In these areas a cam- aign of diamond drilling will be needed to outline accurately and determine he grade of the iron ore. - Anonymous

959. Taylor, J. H. On the Determination of Magnetic Vertical Intensity, Z, by Means of Surface Integrals. Terrestrial Magnetism and Atmospheric Electricity, Baltimore, Md., vol. 49, No. 4, 1944, pp. 223-237.

The main result of the present paper is a separation of Z, the normal omponent of a magnetic field, into parts Z_e and Z_i due to external and inter- al sources, respectively. The resolution is given in terms of surface inte- rals whose integrands involve the observed surface values X and Z of the field. he paper may well be regarded as a sequel to an article by E. H. Vestine, On he Analysis of Surface Magnetic Fields by Integrals, Part I. - Author's abs.

960. Vestine, E. H., and Davids, N. Analysis and Interpretation of Geomagnetic Anomalies. Terrestrial Magnetism and Atmospheric Electricity, Baltimore, Md., vol. 50, No. 1, 1945, pp. 1-36.

The analysis and interpretation of geomagnetic anomalies is discussed. echniques are described for estimating depth and strength of magnetized ore- odies, using tables and graphs of the fields of simple models. Relations mong surface-components of field of anomalies are derived, using fitting or epresentation of anomalies by Fourier series, Fourier-Bessel series, and power eries. A method based on the analysis of surface magnetic fields by inte- rals is also described. Methods are given for estimating probable minimum nd maximum depths to magnetic sources beneath the earth's surface, using easurements of field at the surface. The locations of sources cannot be niquely inferred from magnetic data alone. The use of gradients of field in ocating sources of anomaly is indicated. - Authors' abs.

961. Wasserfall, K. F. Harmonic Analysis of the Annual Variation of Magnetic Declination and Horizontal Intensity at Oslo, 1843-1930. Terrestrial Magnetism and Atmospheric Electricity, Baltimore, Md., vol. 50, No. 1, 1945, pp. 37-46.

In view of the importance of annual variations for the reduction of the eries in magnetic horizontal intensity H and declination D (see Geophys. bs. 106, No. 6152), harmonic analyses were made for these variations. The ata covered the years 1843-1930. The analyses were based on the direct method using Fourier series. The calculated harmonic constants for D and H are presented; some results are embodied in graphs. The findings show that the figures for H are not as favorable as those for D. It is pointed out that harmonic analysis sometimes leads to exaggerated displacement of the phase angle. - V. S.

3. SEISMIC METHODS

7962. Andreotti, G. Ricerche sulla precisione conseguibile nelle determinazioni delle profondità ipocentrali per terremoti di origine vicina (Investigations Regarding the Accuracy Attainable in the Determination of Focus Depth of Nearby Earthquakes). Atti Mem. Accad. Sci. Padova, n. s., vol. 57, 1942, pp. 1-17.

Two determinations were made of focus depth for the earthquake of January 3, 1940, Fonzaso, Italy: (a) By the use of microseismic records from Padua and Triest, and of P-wave commencements; and (b) by means of the formula of B. Gutenberg and the time-difference between the arrivals of P-waves and of surface shear-waves, as registered at Padua and Treviso. Both methods gave the same focal depth of about 12.5 km. There was also calculated the accuracy of focal depth as attainable by the first method. Corrections were introduced for arrival times of individual P-waves, for focal distance, and for the velocity of wave propagation. It was found for the Fonzaso earthquake that an error of ± 0.1 sec. in commencement records, and an error of ± 2 km. in focal distances, produced an error of ± 28.8 km. in focal depth. Furthermore, an error of ± 0.1 sec. in travel time produced in this case an error of ± 15.4 km. in focal depth. - V. S.

7963. Båth, Markus. Sur une méthode pour calculer les tremblements de terre a foyer profond a l'aide des phases d'une seule station seismographique (On a Method for Calculating Earthquakes with Deep Foci by Means of the Phases at a Single Seismographic Station). Kungl. Svenska Vetenskapsakademiens Handlingar, Stockholm, Ser. 3, vol. 20, No. 4, 1943, 22 pp.

In the case of earthquakes with a deep focus, both the distance of epicenter and the depth of focus are unknown. Generally, the method of Gutenberg and Richter is used for their determination; other methods are variations thereof. The author offers a new method more complicated in calculation but more generally applicable; it requires the data of a single station. The principle of this method is described. Surfaces showing the functional dependence of propagation-times on distance and depth are calculated for each one of the phases of a seismogram. The surfaces of different phases are then combined in a three-dimensional space, with coordinates plotted for time, distance, and depth. Next, a plane is drawn for each surface, through its point on the time axis and penpendicularly to this axis. This plane will cut the surface along a curve representing the values of distance and depth corresponding to propagation time. The total procedure will give a system of time curves in a plane of distance-depth. With correct determinations of propagation-times and seismogram-phases, all the curves should intersect at one point, the focus. If errors are made in these determinations, producing a dispersion of intersections, the method of least squares can be used. The author deduces the necessary equations, demonstrates their mathematical application, gives a diagram of the differences between propagation times, and presents six concrete examples of calculation. - V. S.

7964. Bodle, R. R. Progress Report on Seismological Activities of the United States Coast and Geodetic Survey. Trans. Nat. Research Council, Am. Geophys. Union, 1944, pt. II, Washington, D. C., 1944, pp. 269-271.

The seismological activities of the U.S. Coast and Geodetic Survey continued during the period April 1943 to March 1944 with little interference from the war. They included teleseismic work, earthquake information service, strong-motion work, instrument work, and miscellaneous activities. (1) Teleseismic data were published for 23 stations, as heretofore. A few details are given on some stations. (2) Field data were collected from various collaborating stations and consultants. No outstanding earthquakes were observed. (3) Strong-motion work continued at 53 stations of the Survey and at cooperating agencies. The program of reducing accelerograph sensitivity was extended to a few additional stations. Vibration work decreased somewhat in comparison with previous years. Other particulars are given. (4) Instrumental work included the construction of remodeled Neumann-Labarre vibration meters and improvements to some other instruments. (5) Various steps were taken to develop greater cooperation in the Western Hemisphere for the study of earthquakes. - V. S.

Bodle, R. R., and Steenland, N. C. Report on Magnetic Survey and Seismological Observations Made in the Vicinity of Paricutín Volcano, State of Michoacan, Mexico, May - July, 1943. U.S. Coast and Geodetic Survey, Washington, D. C., Special Report Issued for Limited Distribution, 1944, 33 pp. (see abs. 7949 in this issue.)

7965. Bruggen, Juan. Contribucion a la geologia sismica de Chile (Contribution to the Seismic Geology of Chile). Santiago de Chile, University of Santiago Press, 1944, 132 pp.

The geology of Chile is described in relation to earthquakes. The causes of earthquakes, seismicity, isoseismal lines, fault movements, etc., are considered. Regional details are given. The material includes evidence from geodetic measurements. - V. S.

7966. Carder, D. S., and Gilmore, M. H. Ground Vibrations. Bull. Seismol. Soc. America, Berkeley, Calif., vol. 35, No. 1, 1945, pp. 13-26

The ground is continuously in vibration. The frequency and magnitude of these vibrations depends on the nature of the ground and the proximity and nature of causative forces. If the ground is disturbed by normal traffic, nonperiodic impacts, or earthquakes, the ground will tend to vibrate in one or more of its natural periods. However, if the disturbing force is periodic, such as that of reciprocating or unbalanced machinery or of a vibrating rigid building or other structure, the frequency of the disturbance will be carried to comparatively great distances in rigid ground such as rock or compact dry earth. If the structure is flexible or if the ground is nonrigid, such as saturated earth, these forced vibrations are quickly damped out. The behavior of a strong-motion seismograph, if it is housed in the basement of a tall building or in the immediate proximity of a tall rigid building, will probably be influenced by the vibrations of that building during a strong earthquake.

If ample precautions are taken to avoid forced vibrations, a simple observation of microseisms will give one or more, though not necessarily all, of the natural periods of the ground. Some of these periods are often so close together, however, that design of earthquake-resistant structures with special reference to avoidance of dominant ground periods is unsafe because, thus far, periods of structures in the design stage have not been accurately predicted. - Author's abs.

7967. Collins, M. P., and Leet, L. D. The Mexican Earthquakes of April 15, 1941, and February 22, 1943 (Abs.). Trans. Nat. Research Council, Am. Geophys. Union, 1944, pt. II, Washington, D.C., pp. 315-316.

Strong earthquakes were felt in several provinces of Mexico on April 15, 1941, and February 22, 1943. The writers studied their records taken at most of the seismograph stations of the Western Hemisphere. (1) Epicenters were located by the modified station-pair method; the latitudes and longitudes are given. There is evidence that the depths are slightly greater than normal. (2) The distribution of initial condensations and dilations from the earthquake of 1941 falls into a quadrantal pattern. Initial motion from the earthquake of 1943 seems to be compression at all stations. (3) The travel-times of the longitudinal waves from both earthquakes are best-described by a series of straight lines with intersections near 16°, 25°, and 45°. Travel-times for shear-waves give a more complicated picture. - V. S.

7968. Dana, S. W. The Amplitudes of Seismic Waves Reflected and Refracted at the Earth's Core. Bull. Seismol. Soc. America, Berkeley, Calif., vol. 35, No. 1, 1945, pp. 27-36.

The author's recent investigation has dealt with the partition of energy among seismic waves reflected and refracted at the earth's core (see Geophys. Abs. 120, No. 7824). In the present study, the amplitudes of the same waves are expressed in terms of the horizontal and vertical components of the ground displacement which they produced at the surface of the earth. The nderlying assumptions are stated, the mathematical derivation is presented, nd the horizontal and vertical ground displacements (and their ratios) are alculated for different types of waves. The results are tabulated and disussed. Several applications of these calculations to the interpretation f seismograms are indicated. - V. S.

oy, J. B. Geophysical History of South Houston Salt Dome and Oil Field, Harris County, Tex. Bull. Am. Assoc. Petrol. Geol., Tulsa, Okla., vol. 29, No. 2, 1945, pp. 210-214 (see abs. 7936 of this issue).

969. Fu, C. Y. On the Origin and Energy of Oscillatory Earthquake Waves. Bull. Seismol. Soc. America, Berkeley, Calif., vol. 35, No. 1, 1945, pp. 37-42.

A critical survey of the different modes of generation of oscillatory arthquake waves is given. The consequences of the failure of Hooke's law n the dispersion of waves are indicated. The energy of an earthquake is onsidered from the theory of elasticity with a discussion of Sezawa's esult. - Author's abs.

970. Gamburtsev, G. A. On a Mode of Areal Seismic Prospecting by the Correlation Refraction Method. Compt. rend. (Doklady) Acad. Sci. U.R.S.S., Moscow, vol. 43, No. 6, 1944, pp. 239-241.

In areal seismic surveys the refraction method of first arrival-times as serious weaknesses. It handicaps the construction and use of isotime aps plotted as equal travel-time curves of seismic waves generated at a ingle shot-point. The difficulties are indicated. The author's correlaion refraction method (Geophys. Abs. 113, No. 6900) largely resolves these ifficulties and makes indicated isotime maps practicable. This method as employed in the Ishimbaevo region, Russia, in 1942-43. Some findings f general import are discussed: (1) The method offers criteria for judgng the regularity of wave correlation; such criteria are the shape and ntensity of vibrations, and the comparative geometrical characteristics f travel-time curves. (2) These criteria make it possible to separate in he surveyed area the localities within which the wave type remains contant. (3) Finally, a mapping can be made, for the same locality and for xplosions caused at the same point, of several isotime maps referred to everal refracting boundaries. - V. S.

971. Gutenberg, B. Amplitudes of Surface Waves and Magnitudes of Shallow Earthquakes. Bull. Seismol. Soc. America, Berkeley, Calif., vol. 35, No. 1, 1945, pp. 3-12.

A study of amplitudes of surface waves having periods of about 20 econds is employed to improve the calculation of magnitudes of distant shallow earthquakes. Table 3 gives station corrections; table 4, revised figures for the effect of epicentral distance. It is found that for epicentral distances between about 20° and 175° the average observed amplitudes correspond closely to those calculated with an absorption coefficient $k = 0.0003$ per km. For paths completely outside or inside the Pacific Basin, $k = 0.0002 \pm$ per km., while for paths tangent to its boundary the amplitudes of surface waves with periods of about 20 seconds may be reduced by two-thirds or more (in extreme cases by almost nine-tenths) through reflection or refraction of energy; such seismograms of shallow shocks may be taken as indicating intermediate depth of focus. - Author's abs.

7972. Heck, N. H. The Jesuit Contribution to Seismology in the U.S.A. Thought, Fordham University Press, New York, vol. 19, No. 73, 1944, pp. 221-228.

Jesuit contributions to seismology in the period from 1925 up to present war are outlined. An important part is regional investigation carried on at St. Louis, Florissant, Cape Girardeau, and Little Rock, with close cooperation from Cincinnati. The Jesuit stations also participate in locating earthquakes in other parts of the earth. The total number of active Jesuit stations in the United States in recent years has averaged about 56. Other Jesuit contributions to various fields of seismology are indicated. - V. S.

7973. Jones, W. M. The Use of Differences of Arrival-Times of P as an Aid to Epicentral Determinations in the South Pacific. Dominion Observatory Bull. S-72, Wellington, New Zealand, 1944; also: New Zealand Jour. Sci. Tech., Wellington, vol. 26, No. 3B, 1944, pp. 146-154.

Curves have been drawn, covering the more important seismic portions of the South Pacific, showing the differences in P-arrival times between the Wellington and Brisbane, and between Wellington and Suva, Seismological Observatories, for a normal and for a deep-focus earthquake, according to Jeffreys and Bullen's 1940 Tables. Other curves show the distances from these observatories to points over the same area. The plotting is on a Mercator Projection. The use of such curves in determination of epicentres is briefly discussed. The effects of focal depth are illustrated by diagrams which show the magnitude and direction of the displacement of epicentres when normal focus is assumed for a deep-focus earthquake, and two methods are indicated by which a good approximation to an epicentre can be found directly from the P-arrival times at four or more stations, without making any assumption of focal depth. - Author's abs.

7974. Jones, W. M. Table of Direction-Cosines to Four Figures at Intervals of One Degree in Latitude and Longitude Over a Zone of 60° of Longitude and Latitude from 0° to 40°. New Zealand Jour. Science and Technol., Wellington, vol. 26, No. 3B, 1944, pp. 155-159.

These tables are intended for use in seismological problems where the
istance from a given point to any point inside a certain region may be
equired. The direction-cosines of the normals to the surface are given, for
ach degree of latitude between 0° and 40°, and for each degree of longitude
etween 150°E. and 180°. For intermediate points, methods of linear inter-
olation will suffice for most purposes. These tables have been used by
he writer to draw curves showing the differences of arrival-times of "P",
t pairs of observatories from earthquakes in the South Pacific (see abs.
973). - V. S.

975. Keller, F. An Electronic Earthquake-Recorder. Trans. Nat. Research Council, Am. Geophys. Union, Trans. 1944, pt. II, Washington, D. C., pp. 304-309.

The author describes the new features of amplifier and recorder apparatus
t the amateur seismographic station of New Kensington, Pa. The recorder is
esigned according to H. Wolfe's principles, with modifications. It operates
y alternating current and employs three circuits for the electronic ampli-
ier: A photocell-and-preamplifier circuit, a self-balancing phase-inverter
ircuit, and a one-stage push-pull amplifier circuit. In operation, the
mplifier is excited by a small beam of light. The beam is reflected from
he rotating mirror of a galvanometer responsive to the seismograph. The
irror turns to different positions, illuminates a larger or smaller area of
he sensitized surface of a photocell, and modifies the cell's output pro-
ortionally. These variations operate the electrical recorder. Thus, the
onnection between the seismograph and the recorder is frictionless. The
ecorder writes on smoked paper or by ink. The response and wave-form
btained compare favorably with those recorded by the usual observatory-
quipment. Drawings of the apparatus and examples of the seismograms are
iven. (A review appears in Science News Letter, vol. 45, No. 24, 1944,
. 371). - V. S.

976. Köhler, Reinhard. Messung und Bekämpfung unerwünschter Boden- und Gebäudeschwingungen (Measuring and Counteracting the Undesirable Oscillations of the Ground and Buildings). Zentralblatt Geophys., Meterol. Geodäs., Berlin, vol. 10, No. 4, 1943, pp. 161-169.

Engineering seismology is viewed as a study of the vibrations of the
round and of structures, generated by traffic, machinery, and earthquakes.
hese lines of investigation are discussed. In the work, seismographs have
een replaced with instruments specially adapted to structural problems.
ifferent instruments are used for determining the direction, and the velocity
nd acceleration, of vibrations. The problems involved are indicated. The
emedial measures against injurious vibrations fall into several classes:
emoval of causes, adjustment of the structure's own frequencies of vibra-
ions, arrangements preventing the propagation of vibrations, etc. The
easures are described, and some criticisms are made. The question of build-
ngs resistant to earthquakes is treated as regards its various elements and
olutions. A bibliography is appended. - V. S.

McGuckin, G. M. History of the Geophysical Exploration of the Cameron Meadows Dome, Cameron Parish, La. Geophysics, Menasha, Wis., vol. 10, No. 1, 1945, pp. 1-16 (see abs. 7942 in this issue).

7977. Neumann, Frank. Period-Amplitude Analyses of Strong-Motion Records. Trans. Nat. Research Council, Am. Geophys. Union, 1944, pt. II, Washington, D.C., pp. 290-294.

The use of actual ground-motion in engineering seismology involves so much laborious integration that a simpler procedure is desirable. The author investigates its possibility. He looks to acceleration as the basic element to use. Acceleration and velocity formulas and graphic methods for constructing envelope-curves are critically examined. Characteristics of different types of envelopes are studied and compared. It is found, with regard to period-amplitude envelopes, that the single curve in the logarithmic form is simpler than the three or more curves necessary to represent the same thing in linear form. The accumulation of a sufficient number of such envelopes would make it possible to construct "master" envelopes. These should represent to a fair degree the maximum expectable earthquake-motions in terms of period, acceleration, velocity, and displacement. But even they would have to be augmented somewhat to take into account the failure of any period-amplitude envelope to provide for the superposing of two or more wave types on each other. Examples of period-amplitude graphs and envelopes drawn to linear scale illustrate the text. - V. S.

7978. Obert, Leonard, and Duvall, Wilber. Microseismic Method of Predicting Rock Failure in Underground Mining. Part 1: General Method. Bureau of Mines Rept. of Investigations 3797, 1945, 7 pp.

Rock failures in underground mining are often preceded by various visible and audible indications of excessive pressures. These indications can only lead to general prediction. The present report describes a microseismic method that permits quantitative prediction. It aims at determining the distribution of stresses existing in the underground mine structures, such as pillars, arches, etc. It is also broadly applicable, for it can be used in all types of hard-rock mining. The report discusses empirical facts underlying the method, the different testing procedures, the recording and analysis of data, and the interpretations obtained therefrom. The physical characteristics of microseisms are described. The equipment of the method consists of a geophone, a high-gain amplifier, a logarithmic amplifier, a power amplifier, and a graphic recorder. The literature dealing with previous work is indicated. Forthcoming reports will deal with other aspects of the microseismic method. - V. S.

7979. Ostrovskii, A. E. On Seismic Logging. Compt. rend. (Doklady) Acad. Sci. U.R.S.S., Moscow, vol. 45, No. 5, 1944, pp. 184-187.

Electric logging is ill-suited to the carbonate type of oil fields, for he electric resistivity of dense limestones differs but little from that of heir porous, oil-storing facies. But oil and limestone differ greatly in lastic properties. This circumstance suggests the use of seismic logging. The author has experimented with a new technique marked by the following eatures: (1) The source of oscillations is placed directly into the well, o that more clear-cut arrival times are obtained; and (2) two closely located seismographs are used so that the velocity diagram of the well can be drawn from the difference between their travel times. In the experiments, the nstruments were small, vertical well-seismographs equipped with special levices. Electric caps were set off for explosions at different depths of he well. The seismograms obtained for various levels are presented and nalyzed. On their basis, a velocity diagram is drawn for the well in the same way as an electric resistivity diagram. A discussion of these data leads o the following conclusions: (1) The method employed is sufficiently accurate for practical application; (2) it can be used in cased wells; (3) the velocity liagram differentiates between lithological, and sometimes physico-mechanical, properties of rocks; and (4) velocity measurements must be referred to the niddle of the distance between the shot-point and the remote seismograph. Other field tests of the method are mentioned. - V. S.

980. Popescu, I. G. Étude comparative sur quelque tremblements de terre de Roumanie, du type de celui du 10 november 1940 (A Comparative Study of Some Earthquakes in Roumania Similar to that of November 10, 1940). Compt. rend. Acad. Sci. Roum., Bucharest, vol. 5, 1941, pp. 204-223.

A comparative study was made of some former Roumanian earthquakes of the type of the earthquake of November 10, 1940. This study showed that all are characterized by a very extended vibrating area and a long period of vibration. Generally, they begin with strong vertical movements and have their foci in the faulted zone stretching from Vrancea through Foscani to Galatz. Macroseismic data indicate that the focus is about 100 km. deep. - V. S.

7981. Salvatori, Henry. Early Reflection Seismograph Exploration in California. Geophysics, Menasha, Wis., vol. 10, No. 1, 1945, pp. 17-33.

The first major attempt to employ the reflection method in California was made in 1931. The first results were disappointing, but by the early part of 1932 a prospect near Merced was successfully mapped. The correlation method was found to have limited applicability and the dip method was generally adopted. Most of the early work was performed with side spacing of stations and lines since very close control was not considered necessary to discover the larger structural features which were then of greatest interest. As a result of this early reflection work several important oil fields were discovered among which are the Wilmington and Rio Bravo fields. A brief history of the discovery of these two fields is given and the seismic maps are compared with the later geologic maps compiled from well data. - Author's Abs.

7982. Savarenskii, E. F. Seismic Waves Refelected from a Boundary at a Depth of 900 Kilometers (in Russian). Akademiia Nauk S.S.S.R., Trudy Seismologicheskogo Instituta, Moscow, No. 106, 1941, pp. 6-8.

A study was made of the velocities of longitudinal and transverse waves P_{900} and S_{900} reflected from a boundary located at a depth of 900 kilometers. Such a boundary was selected because it was assumed that at depths less than 900 km. velocities increase faster than at greater depths. The seismograms recorded at the stations of Central Asia during 1934-36 provided the data. On the basis of this material, propagation times were computed for the differences (P_{900}-P) and (S_{900}-S), corresponding to depths between 0 and 800 km. The calculations are described, the formulas cited, and the results presented. Insufficient material has prevented an exact determination of the position of reflecting boundary. - V. S.

7983. Sawdon, W. A. Geophysical Work in Paraguay Indicates Extent of Exploration in South America. Petroleum Engineer, Dallas, Tex., vol. 16, No. 6. 1945, pp. 81-82.

The Union Oil Co. of California has contracted with the Paraguayan Government to explore for oil an area comprising more than 54,000,000 acres in the Chaco territory. This area is flat, marshy, and silt-covered; it bears forest, long coarse grasses, and scrub. The local geology is little known. The Western Geophysical Co. has been retained to perform the geophysical work. At present, seismograph surveys appear to be the most advantageous. One seismograph party is already surveying, and a second crew is being assembled. Current reports indicate that good seismograph records are being obtained to relatively great depth, so that there is no question but that the area can be worked by seismograph. - V. S.

7984. Strautyn, E. F. The Problem of Average Velocities in the Interpretation of Seismic Observations in Western Siberia (in Russian). Akademiia Nauk S.S.S.R., Trudy Seismologicheskogo Instituta, Moscow, No. 106, 1941, pp. 45-48.

In 1939 the Geophysical Trust of U.S.S.R. made a seismic reflection survey of the Western Siberian depression in the regions of Ploskoe and Nazyvaevskoe. The geological evidence pointed to a foundation of hard Paleozoic sandstone, schist, and limestone, covered with a layer of sand and clay. Such composition would result in an increase of average velocity with the depth of penetration of waves. The data of the survey were used to verify this deduction. The average velocity of a reflected wave was computed by the method of quadratic coordinates and plotted against the depth of penetration of the wave. The curve showed, contrary to expectation, that the average velocity increased with depth only up to a certain depth-limit, whereupon it began to decrease; the limit was 900-1,000 meters for Ploskoe, and 1,800-2,000 meters for Nazyvaevskoe. To clarify such conflict of evidence, an empirical determination was made of actual specific velocities by means of "vertical" hodographs. The method is described, and the resulting curves are shown. The odographs gave a continuous linear relationship between specific velocity nd the depth of penetration of waves, thus confirming the initial geological eduction. These findings are analyzed. The conclusion is drawn that the se of curves of average velocity in the investigated regions, and generally n Western Siberia, requires special study and much judgment. - V. S.

985. Vesanen, Eijo. Über die typenanalytische Auswertung der Seismogramme (Regarding the Interpretation of Seismograms by Means of a Type Analysis). Ann. Acad. Sci. Fennicae, Helsingfors, A.3, vol. 5, 1942.

The seismic waves P and S of different earthquakes were studied for deter- ining their common characteristics. 244 earthquakes recorded at the Helsing- ors station during 1925-40 and having epicentral distances between 43° and 4° furnished the material. The detected characteristics served to group the arthquakes into definite types, classes, and subclasses. Further, the maps f local epicentral distribution revealed that there corresponded to a seis- ic type a certain epicentral grouping or topographic region, to a class a istrict, and to a subclass an area. These findings lead the author to con- ider that further studies may establish relationships between seismic haracteristics of shocks and topographic characteristics of epicenters. uch knowledge could bring about new and simpler methods of determining dis- nces, locations, and depths of the foci by means of a type analysis of eismograms. Other features of earthquakes may likewise be discovered. The thor's study of epicentral groupings has already shown that rapid successions f shocks are not as rare as believed. In some epicentral regions they seem o be the rule rather than the exception. - V. S.

986. Wolf, Alfred. Motion of a Rigid Sphere in an Acoustic Wave Field. Geophysics, Menasha, Wis., vol. 10, No. 1, 1945, pp. 91-109.

A rigid sphere in the field of plane acoustic waves in a fluid or in an lastic solid medium is subjected to harmonic forces in the direction of pro- agation of the waves, and proportional to their amplitude. The response urve is a function of the ratio of the circumference of the sphere to the ve length, and of the ratio of the mass of the sphere to the mass of the isplaced medium. In an elastic solid, Poisson's ratio must also be included mong the variables.

The response curve in fluids decreases continuously with decreasing wave ength. In elastic solid media, the response curve has a maximum which is ue to resonance effects. In general, the greater the mass of the sphere he smaller the response except in the neighborhood of resonance in elastic olid media..

The scattering of acoustic waves by a rigid sphere is determined. The otential of scattered waves is developed in a series of spherical harmonics; t is shown that only the first order coefficents are affected by the motion f the sphere. - Author's abs.

4. ELECTRICAL METHODS

7987. Alder, R. L. Advanced Design Provides Maximum Efficiency in Electrolog Service. Tomorrow's Tools - Today, Los Angeles, Calif., vol. 11, No. 1, 1945, pp. 20-23.

The latest improvement in the design of the Lane-Wells Electrolog includes automatic curve recording, steel-shroud multiconductor cable, depth-measuring sheave, sinkers for bad bridging conditions, metal contacts for logging in oil base fluid, etc. These improvements permit faster and more precise work as well as operation in difficult conditions, such as slant holes. Special equipment is also provided for magnetic directional surveys and for temperature surveys in open and cased holes. The applications of the Electrolog and of its accessory parts to different problems are described. The typical field unit consists of separate hoist and instrument trucks. In logging, five standard curves are traced, three of which can be recorded simultaneously on the automatic photorecorder. - V. S.

7988. Deegan, C. J. Electrical Logging Widely Employed in Rocky Mountain Exploratory Tests. Oil and Gas Jour., Tulsa, Okla., vol. 43, No. 48, pp. 60-61.

In Rocky Mountain oil fields, the connate waters lack salinity while the permeability of formations is low. These conditions handicap the use of electrical logs: (1) The fresh formation waters make for little self-potential on the logs due to the similarity in salt content between the mud in the hole and the water in the formation; (2) resistivities are often high because fresh waters are poor electrolytes for the conduction of current; and (3) low permeability creates high water saturation even in the producing horizons, so that there may be no sharp line of demarcation between oil zones and water-bearing zones. As a result, electrical logs present in this area an unusual pattern, and a visual interpretation is difficult. Fortunately, calculation methods have been developed for these logs. They permit computation from the electric curves of the amount of water saturation in the formation. This knowledge is valuable in interpretation, and the calculations have now become a routine in this area. - V. S.

7989. Fritsch, V. Notes on the Investigation of Geoelectrical Lightning Hazards. Gerlands Beitr. Geophys., Leipzig, vol. 57, No. 1, 1940, pp. 65-108.

Statistical data are given on the damage due to lightning reported by German insurance companies in 1939. The effect of local variations in soil resistivity on the liability of direct lightning hits and on the protective range of lightning conductors is discussed, and the importance of seasonal variations in the earthing resistance of protective systems is emphasized. With a view to investigating these effects, a test field is described which appears to be particularly prone to damage by lightning. Several cases of past damage, and the methods of investigation to be adopted, are described. - R. H. G., Sci. Abs., vol. 27, No. 561, 1944.

990. Fritsch, V. Note on the Work Done in 1941 at the Lightning Test Field of Absroth. Gerlands Beitr. Geophys., Leipzig, vol. 59, No. 3/4, 1943, pp. 306-330.

Cases of lightning damage in the test field during 1941 are described see also abs. 7989). For the neighboring German Province of Saxony, deailed statistical information is given on lightning damage to buildings uring 1927-40. Various methods for measuring earthing resistances are disussed and the results obtained with test electrodes are investigated with espect to yearly and monthly variations, and the effect of rainfall. - .H.G., Sci. Abs., vol 47, No. 561, 1944.

991. Gabriel, V. G. Application of Electric Transient Method in Oil Exploration. Petroleum World, Los Angeles, Calif., vol. 42, No. 1, 1945, pp. 44-46.

Transient magnitudes of current and of potential arise in an electric ircuit when the current has been applied or removed suddenly. The decay nd build-up times are a function of impedance and other factors. The lectric transient (Eltran) method of oil prospecting makes use of the hanges caused by subsurface anomalies in the wave-form of transient characeristics. This method is still in an experimental stage. The author riefly discusses its principles and outlines the contributions of the chief orkers, C. and M. Schlumberger, Blau, Hawley, Statham, Rosaire, West, lipsch, and Blondeau. A table cites the publications describing surveys ade with the transient method. - V. S.

992. Jones, P. J. Characteristics of Electric Logs. Oil and Gas Jour., Tulsa, Okla., vol. 43, No. 33, 1944, pp. 75-81.

An electric log has an SP (self-potential) curve, and it may have three esistivity curves. One of the objectives of electrical logging is to record he resistivity of the pay in reservoirs. However, the resistivity recorded n electric logs may be influenced by several factors. First, there are he diameter of a well bore and the resistivity of the mud in the well bore. econd, mud filtrate may invade some beds and change the resistivity of the nvaded region. Lastly, the thickness and the resistivity of pay and non-ay must also be taken into consideration. The SP recorded at a given depth s probably the sum of a number of possible sources of potential. The prinipal sources of potential, however, are said to be filtration and resistivty potentials. The SP curve is also influenced by the resistivity of mud nd by invasion of mud filtrate. Apparently, control of mud resistivity nd of filtration characteristics is just as important to obtain reliable P curves as it is to obtain reliable resistivity curves. - Author's abs.

993. Jones, P. J. Application of Electric-Log Data. Oil and Gas Jour., Tulsa, Okla., Vol. 43, No. 34, 1944, pp. 270-273.

Probably the first step in the application of electric-log data to production is to check the reliability of the resistivity recorded on an electric log. The next step may be an estimate as to the top and bottom of the pay in a given well and reservoir. The bottom of a pay may be water contact or a gas contact. Deductions for nonpay within the interval between the top and bottom of a pay can amount to a sizable fraction of the interval. Nonpay may be more resistant, or less resistant, than pay. A dense nonpay having a high resistivity is sometimes mistaken for pay. The more important criteria for distinguishing pay from nonpay are discussed. A procedure for estimating interstitial water for the pay found in a well is considered in detail. - Author's abs.

7994. Lewis, W. B. Working Depths for Low Frequency Electrical Prospecting. Geophysics, Menasha, Wis., vol. 10, No. 1, 1945, pp. 63-75.

Electrical measurements were made on the surface of the earth with low frequency commutated current using nineteen separate frequencies and six electrode separations. Analysis of the data indicates that there is an effect of appreciable magnitude attributable to an interface 6,000 feet below the surface. - Author's abs.

7995. Turkisher, R. I. A Problem in Vertical Electrical Sounding (in Russian) Bull. Acad. Sci. U.R.S.S. (Izvestiia), Ser. Geogr. Geophys., Moscow, vol. 8, No. 4, 1944, pp. 154-156.

The effect of an intermediate layer in vertical electrical sounding has been previously investigated by the author (see Geophys. Abs. 120, No. 7858). A special case of this problem is now considered. The electric field of a point-source is situated over a two-layer medium: (1) The upper layer has a thickness "h" and a conductivity "σ" continuous and diminishing linearly from a value σ_0 on the earth's surface to zero at the depth h; and (2) the lower layer is nonconductive and infinite in depth. In the calculations, the equation of a continuous potential of the field of a point-source was used for deducing the formula of apparent resistivity; the derivation is presented. The values of apparent resistivity were computed in their dependence on the distance from the point-source; they are tabulated and plotted into a curve. This curve is discovered to be practically identical with (1) the curve of apparent resistivity for the case of an upper layer having a constant conductivity, and with (2) the curve of apparent resistivity for an upper layer with a constant conductivity and an intermediate layer with a linearly decreasing conductivity, other conditions being equal. Thus, as far as can be judged from resistivity curves, there is no difference in apparent resistivity between upper layers with a constant and linearly diminishing conductivity. - V. S.

5. RADIOACTIVE METHODS

996. Bulashevich, Iu. P. The Application of the Radioactive Method to the Search of Pegmatites in the Alkaline Belt of the Urals (in Russian). Bull. Acad. Sci. U.R.S.S. (Izvestiia), Sér. Geol., Moscow, No. 3, 1944, pp. 28-35.

The radioactive method was used in prospecting for pegmatites in the ishnevye Gory. These mountains form the northern part of the alkaline belt f the Urals; their geology is indicated. At first, tests were made of rock amples by the alpha technique. They showed that the alpha activity of pegatites was higher than that of the container rocks, and that the pegmatites hemselves differed much in activity. These findings indicated the applicaility of radioactive prospecting. Then a field survey was made by means of he emanation method. Holes were bored along traverses, and the subsoil air as pumped from them into an ionization chamber and tested for thorium emanaion. The results were plotted as emanation profiles; special measures were aken to ensure the comparableness of data. The profiles are described and iscussed. The following conclusions are reached: (1) The local pegmatites, r their contacts with container rocks, generate high emanation and can be etected as radioactive anomalies; and (2) distinct differences exist among he minerals of the nepheline-syenite pegmatities as to content of radioactive lements; such content is highest in zirconium and pyrochlorine. - V. S.

997. Curtiss, L. F., and Brown, B. W. Frequency Meter for Use with Geiger-Müller Counter. Nat. Bur. Standards, Jour. Research, Washington, D.C., vol. 34, No. 1, 1945, pp. 53-58.

The authors describe an improved circuit for reading the rate of pulses rom a Geiger-Müller counter. Based on the usual procedure of leveling and ectifying the pulses to charge a condenser, the improvements concern a bridge ype vacuum-tube voltmeter to read the voltage on the condenser and an arranement to compensate parasitic potentials developed in the rectifier for the ulses. Since one small transformer provides an adequate source of potentials, he circuit is particularly useful in portable instruments. Great care has een taken to design a circuit that is independent of the voltage of the lternating current mains from which it is operated. A modification of the ircuit for rapidly decaying sources is also described. - Nat. Bur. Standards, ech. News Bull. 333, 1945, p. 2.

998. Gemert, A. G. M. van, Hartog, H. den, and Muller, F. A. Measurements on Self-Quenching Geiger-Mueller Counters, I-II. Physica, Hague, vol. 9, 1942, No. 6, pp. 556-564, and No. 7, pp. 658-664.

1. Counters with vapor admixtures and techniques of measurement are riefly outlined. Next, there is described a determination of the temporal ourse of the current in counters at discharge. The voltage was delivered to cathode-ray oscillograph through a small series-resistance. At the same ime, the counter was illuminated at different places throughout its length

with a gamma-ray source. It was found that Trost's relationship between current and time i = k/t for the discharge can be extended to apply to the shortest measurable value of t, 0.05 microsec. But the conception of current must be further adapted to the conditions in the counter. Some other findings are given. Montgomery's hypothesis of induction generated by a charge wandering in space is followed through with calculations. - V. S.

2. New apparatus has been developed for precise and simple determinations of the resolving power and charge size of counters. Two models are described. One measures the charge size by making it dependent upon the voltage; this is accomplished by means of an electron-ray oscillograph and a condenser attached to the counter. The other also uses the oscillograph and measures both the charge size and the resolving power. A calculation bearing on these values and based on a simple conception is presented by the author; it agrees well with empirical measurements. Certain conclusions are made, which should be useful both theoretically and practically. - V. S.

7999. Jezewski, M., and Miesowicz, M. Étude des compteurs de Geiger-Müller (A Study of Geiger-Müller Counters). Jour. Phys. Radium, Paris, ser. 8, vol. 1, 1940, pp. 221-230.

The optimal use of Geiger-Müller counters was studied experimentally at the Institue of Physics, Academy of Mines, Cracow. The following results were obtained: (1) When the counter is filled with gas, such as air, hydrogen, or noble gases, a relatively higher electric series-resistance must be employed. The purity of the gas should not be too high. Cathode cylinders treated with a 30-percent nitrous acid successfully passed the experimental tests. The anode-wire material was found to be of no consequence, as had been discovered by other investigators. (2) Substantially more advantageous are the counters filled with vapor, such as alcoholic or acetone vapor, etc.; acetone is preferable because of its higher vapor pressure. The performance of these counters is illustrated by oscillograph records made of the course of pressure during the discharge. The average strength of the current during the much shorter discharge is here about 100 times greater than in gas filled counters. This advantage is explained by higher specific ionization in vapors. - V. S.

8000. Marsden, E., and Watson-Munro, C. Radioactivity of New Zealand Soils and Rocks. New Zealand Journal of Science and Technology, Wellington, vol. 26, No. 3B, 1944, pp. 99-114.

Measurements of the alpha-ray activity of various soils and rocks in New Zealand, Australia, and Great Britain are recorded. Analysis of the results shows that soil radioactivities are dependent upon the rocks from which they are derived rather than the type of soil. Basalts, andesites, rhyolites, and limestones gave low readings, while granites and greywackes gave high readings of alpha-ray activities in ionization currents x 10^{18} /cm.^{2}. These results were confirmed in the case of greywackes and basalts by observations with the gamma-ray chamber. The gamma-ray activity of potassium salts in the samples influenced the results considerably. - Authors' abs.

3001. Maxwell, C. T. Radioactivity Economics. California Oil World, Los Angeles, vol. 37, No. 18, 1944, pp. 6-9.

The value of radioactivity logging in locating cased-off potential producing zones in old wells is discussed. Radioactivity logging not only indicates where the pipe should be perforated to obtain maximum production but also shows whether the expected zone is present or not. Frequently it locates potential zones that are not even suspected. - Author's abstract.

3002. Milatz, J. M. W., and Velden, H. A. v. d. Quantitativity of Geiger-Counters for γ-Rays. Physica, Hague, vol. 9, No. 2, 1942, pp. 169-176.

By means of measurements on the quantitativity of well-degassed Geiger counters for γ-rays it is shown that the probability of the production of a kick when a pair of ions is formed amounts to one. - Author's abs.

3003. Vernadsky, V. I. Radiogeology and Its Significance for the Geology of Today (in Russian). Internat. Geol. Cong. Rept. of 17th Sess., Moscow-Leningrad, 1937, vol. 1, Moscow, 1939, pp. 215-239.

The development of radium research is outlined. C. Schuchert and the committee of G. Knopf in Washington demonstrated the applicability of radioactivity to geology in 1924-31; their studies showed that the determination of time by radioactive disintegration agrees with geological determination. Strutt, Jolly, Rutherford, von Grosse, and Khlopin worked on problems of radioactive heat, effects on uranium, geological processes, geological age, etc. The author is concerned with geological thermodynamics and time determinations viewed in the light of radiogeology. He sees here three basis problems: (1) The maximum age of the regions of the planet connected with metamorphism; (2) The precise scale, in decamiriads, of all geological systems; and (3) the duration of geological processes developing in the earth's crust. His view is that all the factors necessary for a complete cosmogenic explanation are reducible to the power, duration, and energy-output of radioactive processes in the earth. - V. S.

3004. Wickman, F. E. On the Emanating Power and the Measurement of Geological Time. Geol. För. Förh. Stockholm, 1942, vol. 64, 1943, pp. 465-476.

Unless taken into account, the emanating power may, in certain cases, be a source of error in age determination. Formulae are given and plots of AcD/RaG with RaG/UI for Swedish kolm ("diffusion age" 442 million years, compared with previous estimates ranging from 388 to 770 million years), thucholite, and uraninite. - L. J. S., Mineralog. Mag., London, vol. 27, No. 187, 1944, p. 69.

8005. Winter, A. B. A New Application for the Neutron Log. Tomorrow's Tools - Today, Los Angeles, Calif., vol. 10, No. 4, 1944, pp. 26-27.

Some purely physical features of oil wells affect radioactivity logs. Such features are: Entering a casing string from open hole, leaving the top of a liner, meeting fluid level inside casing, etc. Neutron curves respond to these features by larger shifts than gamma-ray curves. Since information on these subsurface conditions is valuable in itself, a new field of application is thus opened for neutron logging. The author lists recordable physical features of wells, indicates the character of corresponding shifts on neutron curves, and discusses the practical uses of them. An example of application is described. - V. S.

6. GEOTHERMAL METHODS

8006. DeLury, J. S. Generation of Magma by Frictional Heat. Am. Jour. Sci., New Haven, Conn., vol. 242, No. 3, 1944, pp. 113-129.

Indications that the crust of the earth is strong and thick into depths of 700 kilometers or more, together with evidence that abundant igneous rocks correspond in composition to shallow earth layers, require an appeal to magma sources other than the subcrustal weak shell of isostasy which is commonly accepted as an inherited and potential source. A hypothesis is offered to explain the origin of magmas within the crust by appealing to mechanical sources of heat. The failure of a thick crust, brought about by thermal contraction of the earth, is considered to be effected by a piecemeal operation involving different parts separately during a long period of time, rather than by a brief and final collapse embracing the entire structure. Elastic downwarping of the crust to form geosynclinal depressions is followed by a long process of failure of the lower and major part along one or several underthrust fault planes. This failure provided a plausible explanation of plutonic earthquakes. The outer shell of the crust is the last part to fail. Owing to its greater compressibility it is not compelled to yield until after deeper layers have been relieved of the horizontal compressive stress. This manner of failure prescribes the slipping of large areas of thick crustal shells over and under each other with a development of enormous quantities of frictional heat. Magmas are accordingly created in more or less continuous sheets along nearly horizontal fault planes beneath wide regions. Thermal expansion leads to elevation of these regions, so that, when the outer crustal layer fails, a "head" exists above the sheet of magma derived in the failure. Regional subsidence drives the magma forcefully into regions of lower "head" and in this process additional mechanical heat for magma generation is supplie by friction in the highly viscous magma. Applications of the hypothesis to explain major deformations near the surface are indicated. - Author's abs.

8007. Kraskovsky, S. A. Geothermal Measurements in Coal Districts (in Russian). Akademiia Nauk S.S.S.R., Trudy Komissii po Geotermike, Moscow, Vypusk I, 1941, pp. 12-16.

The author reviews 27 geothermal surveys made of coal districts in vari- us parts of the U.S.S.R. during 1907-33. The districts were distributed over entral Russian Provinces, Don Basin, Caucasus, Poland, Northern Siberia, etc. he depth of measurements ranged from 28.0 to 819.3 meters. The results howed temperatures varying from 4.5° to 34.4°C. and geothermal gradients anging from 24.6 to 38.4 m/C°. Some surveys are described in detail. The easurements made near Stalino beginning with 1931 were combined with methodo- gical investigations. They showed that different boreholes can have iden- ical curves of thermal distribution through depth. An experiment indicated hat an 8 hours' cold washing of a borehole had no material effect on its hermal regime. The average thermal gradient in the Stalino district was 5.3 m/C°. Generally, the geothermal gradients in coal districts were small. he causes have been studied theoretically by N. Korytnikova in 1936. She ound that the heat generated by the coal cannot be a sufficient explanation f small geothermal gradients, as Höfner had supposed. - V. S.

7. GEOCHEMICAL METHODS

08. Henderson, H. I. Soil Analysis for Prospecting. Petroleum Engineer, Dallas, Tex., vol. 15, No. 9, 1944, p. 116.

The Surface Analysis Co. has developed a process of analyzing the soil or accumulations of hydrocarbons. This process is being used now in geo- hemical surveys for oil. A brief outline is given of the principles under- ying the analysis, the difficulties in distinguishing between hydrocarbons f different origin, and the conditions favorable to practical application. he conditions include unconsolidated overburden, water on the surface, and opography advantageous for the accumulation of transformed hydrocarbons. - S.

09. Souther, R. E. Application of Mud-Analysis Logging. Geophysics, Menasha, Wis., vol. 10, No. 1, 1945, pp. 76-90.

The mud analysis logging system, now widely used for exploratory and outine drilling, continuously analyzes and records the oil and gas content f mud returns from wells being drilled by the rotary method. Oil and gas etected in the returning drilling fluid indicates oil or gas in the forma- ion penetrated by the bit. Results of the continuous analyses are instrumen- ally correlated to the depths and formations from which the showings origi- ated. A second useful phase of the system plots accurately and in detail ate of penetration or drilling speed on the log as a function of depth. rucks and trailers provide a mobile housing for all of the mud-analysis quipment so that it may be moved rapidly from well to well.

Applications of the method may be divided into two classes:

Routine drilling in proved areas where it eliminates unnecessary coring and locates gas caps and completion zones.

Exploratory drilling in which it minimizes coring by indicating for testing purposes porous zones containing oil and/or gas.

Mud-analysis logging can be practiced in areas where the electrical log cannot be used due to high salt content or other local conditions, where dangerous hole conditions make interruption of drilling operations for coring inadvisable, and for evaluating gas zones where cores are difficult to interpret.

In addition, each mud-analysis logging unit contains equipment to obtain information useful in eliminating wash-outs, in predicting and preventing blow-outs, and in controlling drilling mud characteristics. - Author's abs.

8010. ZoBell, C. E. Transformation of Organic Material into Petroleum - Bacteriological and Sedimentation Phases. Am. Petrol. Inst., New York, Annual Report of Progress - Fundamental Research on Occurrence and Recovery of Petroleum, 1943, pp. 103-104.

Petroleum is considered to be formed from organic materials accumulating with sediments. Acting on this hypothesis, the Scripps Institution has conducted investigations for several years on the role of bateria in such transformation. The method employed consisted in studying the recent sediments with a view to learning about the conditions under which the older oil-bearing horizons have been formed and can be discovered. The area investigated covered the source sediments off the coast of southern and lower California. The results to date substantiate the view that bacteria are important agents affecting the transformation of organic matter and influencing physiochemical and geological conditions in sedimentary deposits. A number of particular observations are indicated, and the program of further research is outlined. - V. S.

8. UNCLASSIFIED METHODS AND TOPICS RELATED TO GEOPHYSICS

8011. Bays, C. A., and Folk, S. H. Geophysical Logging of Water Wells in Northeastern Illinois. Illinois State Geol. Survey Circ. 113, Urbana, 1944, 19 pp.

Experimental studies have been conducted in Illinois for testing application of geophysical methods to water wells; information was also sought on the water-producing zones and conditions in northeastern Illinois. A number of different instruments were run in wells to obtain various types of data on the wall rock and fluids. As the investigations progressed, modifications of the usual techniques, measurements, scales, and interpretative practices were developed. In addition, tools and techniques were devised for particular water-well problems. The authors designate the records obtained through these methods as "geophysical logs". Geophysical logs have been made for more than 20 wells in northeastern Illinois, and from them many useful principles were worked out. The geophysical data were closely integrated with geological and production data with a view to obtaining a basis for generalization and specific recommendations. - V. S.

)12. Cederstrom, D. J. Selected Well Logs in the Virginia Coastal Plain North of James River. Virginia Geolog. Survey Circular 3, University, Va., 1943, 82 pp.

In 1937 the Virginia Geological Survey, in cooperation with the Federal eological Survey, undertook an investigation of the ground-water supplies of he coastal plain of Virginia. The author presents data regarding the logs f 83 wells on that plain, north of James River. The depth and thickness of he layers recorded are listed for each well. The local geology is outlined. he material of the survey south of James River will also be published. - V.S.

)13. Cram, I. H. Team of Geology and Drill Has Responsibility of Solving Industry's Oil-Finding Problem. Independent Petrol. Assoc. America Monthly, Tulsa, Okla., vol. 15, No. 6, 1944, pp. 46-48.

The oil industry has, fundamentally, two prospecting tools--geology and he drill. Geology utilizes all available instrumentalities and interprets he final results. The existing instrumentalities include geophysics which rovides scientific apparatus and techniques for gathering geological data. eophysicists are particularly needed as designers and operators of geophysi-al instruments and as interpreters of their findings. At the present time eophysical methods should be approached especially from the standpoint of he independent producer. The author briefly reviews the Fitts-pool dis-overy and some geophysical methods from this angle. - V. S.

)14. Heiland, C. A. Geophysical Prospecting Increased 30 Percent in 1944. World Petrol., New York, vol. 16, No. 3, 1945, pp. 46-49.

Condensed from a report by the author prepared for the American Institute f Mining and Metallurgical Engineers and published in Mining and Metallurgy, ol. 26, No. 458, 1945, pp. 99-104 (see Geophys. Abs. 120, No. 7883). The ata of F. H. Lahee on productive and dry wildcats in 1943, cited in both ersions of Heiland's report, have been indicated in Geophys. Abs. 118, No. 596. They may be restated in fuller form. The productive wildcats in 1943, ich grouped under methods of exploration, constitute the following percentages f the total number of wildcats drilled in that year: (1) Sundry nontechnical ethods, 4.5 percent productive; (2) unknown methods, 7.5 percent productive; 3) geology, 18.5 percent productive; (4) geophysics, 21.5 percent productive; 5) geology and geophysics, 21.5 percent productive; and (6) total percentage roductive, 17.0 percent. - V. S.

)15. Kothny, G. L. The Application of Oil Well Surveying Instruments and Technical Services in the Mining Industry (abs.). Econ. Geol., Lancaster, Pa., vol. 40, No. 1, 1945, p. 89.

This paper discusses some of the outstanding developments made in the use f well surveying instruments and the drilling techniques by the petroleum ndustry. It describes various types of instruments in use, their requirements and methods of operation, the benefits obtained from their use and how these instruments can be obtained. Instruments used by the mining industry are also briefly described and their performance compared. The adoption by the mining industry of the techniques used in the petroleum industry is advocated in view of the beneficial results to be obtained. A simple method of determining the direction and the angle of the core samples taken off core trays is also briefly described. - Author's abs.

8016. Levings, W. S. Aerogeology in Mineral Exploration. Colorado School
Min. Quart., Golden, Colo., vol. 39, No. 4, 1944, 77 pp.

The purpose of this paper is to show the possibilities of geological observation from the air as an accessory to ground exploration for mineral deposits. The contents cover the various types of aerial photographs, aerial equipment, flying routines, advantage of air surveying, conditions and criteria of geologic inference from air views, importance of experience in interpretation, etc. Salient features of the aerial photographic map are indicated. The methods applied in oil exploration are broadly contrasted with those in the search for ore deposits. Attention is given to the successes and techniques of aerogeology in various countries. In conclusion, the possibilities of color photography and the helicopter are examined. A bibliography is appended. (A review appears in South African Min. Eng. Jour., Johannesburg, vol. 55, pt. 2, No. 2710, 1945, pp. 497-499.) - V. S.

8017. Levorsen, A. I. The Search for New Oil Provinces. Petroleo Interameri
cano (Printed in Spanish and English), Tulsa, Okla., vol. 2, No. 3, 1945,
pp. 98-103, 142-157.

The vast majority of oil and gas pools consist of varying combinations of structural and stratigraphic factors. So far prospecting has been mostly concerned with structural factors. It now becomes necessary to look for stratigraphic factors. Two geological conditions offer particular promise in the latter search: (1) Wedge belts of porosity in the reservoir rock; and (2) successive geological layers, each separated by an unconformity and having its own independent oil and gas geology. These conditions are discussed in their relation to oil and gas accumulations. It is pointed out that they can be discovered by the resolution of the greatest possible mass of geophysical data into stratigraphy and sedimentology, as well as into structural geology. Such approach requires a preparation and study of facies maps, lithologic maps, isopach maps, paleogeographic maps, paleogeologic maps, quantitative and qualitative sedimentation investigations, and detailed stratigraphic analyses of porous sedimentary rock units. The work involved in accumulating, organizing, and reexamining the underlying information is outlined briefly. - V. S.

8018. Miller, F. S. Graphs for Obtaining True Thickness of a Vein or Bed.
Econ. Geol., Lancaster, Pa., vol. 40, No. 1, 1945, p. 91

This paper presents graphs from which can be read the correction factor
at must be applied to the apparent thickness of a bed or vein, as measured
ong a drillhole or traverse, in order to obtain the true thickness. -
thor's abs.

19. Oil and Gas Journal. Expansion of Foreign Exploration Calls for More
Geophysical Activity, S. E. G. is Told. Tulsa, Okla., vol. 45, No. 49,
1945, pp. 94-96.

The Petroleum Administration for War made a report at the meeting of the
erican Association of Petroleum Geologists in April 1945. This report
vealed that, according to the world petroleum-supply programs for 1945
d 1946, foreign countries in the Eastern and Western Hemispheres will not
able to meet their requirements for oil from the existing fields. There-
ore, exploration for new oil fields is being expanded. Geophysical methods
ay an increasing role in this work. During the second half of 1944, about
geophysical crews were engaged each quarter in foreign operations. Appro-
mately two-thirds of the investigations were seismic and the rest almost
tirely gravimetric. 94 percent of all crews operated in the Westen Hemi-
here. For the entire year 1945, geophysical programs contemplate an in-
ease of 50 percent in the number of foreign crews. Seismic investigations
e again expected to make two-thirds of the total exploration. The propor-
on of crews allotted to the Western Hemisphere remains close to 95 percent.
the P. A. W. statistics, foreign geophysical operations are differentiated
areas and methods; the foreign countries are grouped into four divisions:
) Mexico, Central America, West Indies; (2) Caribbean; (3) other South
erica; and (4) Eastern Hemisphere. - V. S.

20. Petroleum. The British Oilfield.. Petrol., London, vol. 7, No. 11,
1944, p. 204.

An oil field has been discovered in Britain during the present war.
e discovery is the result of many years of search. At the outbreak of
stilities a total of 20 areas had been explored. This work comprised 61
st wells measuring 60,000 feet and covered a substantial portion of the
lands. Geophysical methods contributed to this exploration; the seismic
thod was found to be the most suitable. - V. S.

21. Rich, J. L. Oil Possibilities of South America in the Light of
Regional Geology. Bull. Am. Assoc. Petrol. Geol., Tulsa, Okla., vol.
29, No. 5, 1945, pp. 495-563.

The petroleum possibilities of a region depend on the presence of thick
ctions of sedimentary rock of favorable facies, preferably marine; on the
nditions of sedimentation when the rocks were deposited; and on their sub-
quent structural history. In assessing the petroleum possibilities of
uth America these factors have been taken into account in so far as avail-
le data permit. The principal sedimentary basins are indicated on maps and

the features of each discussed from the point of view of the petroleum geologist. The survey indicates large areas that are potentially petroliferous, and an attempt has been made to classify them into three groups: (a) Most favorable, (b) moderately favorable, and (c) possibly petroliferous but for various reasons less promising than the two preceeding groups. An unexpected result of the study was the suggestion that the eastern half of the great sub-Andean sedimentary trough may hold more accessible oil than the western half. Inaccessibility, unfavorable climate, and dense vegetation cover will retard exploration and development of the sub-Andean belt from northern Bolivia to Central Colombia. - Author's abs. (References are made to some geophysical surveys. A bibliography is appended. - V. S.).

8022. Rust, W. M., Jr. How to Judge Geophysical Methods. Oil Weekly, Houston, Tex., vol. 117, No. 6, 1945, pp. 56-57, 70.

After the war, many new methods and modifications of old methods are likely to be offered by geophysicists for improving oil search. The author advances five criteria for recognizing among such offers the proposals of real merit. (1) A sound method must be based on physical measurements of some property of the earth. (2) The measurements must give reproducible results. (3) The cost must not exceed that of existing methods. (4) The data must be significantly related to the occurrence of oil. This criterion can be applied theoretically or empirically; both applications are discussed. (5) The method must have a teachable interpretation. Generally, the author believes that improvements in instruments and techniques will be helpful in achieving greater efficiency in exploration, but that advances in the thinking of geophysicists are even more important. - V. S.

8023. Singewald, J. T., Jr. The Oil and Gas Play in Maryland. Jour. Assoc. Am. State Geol., Trenton, N. J., vol. 15, No. 4, 1944, p. 24.

In Maryland, oil and gas beds outcrop on the Western Shore and on the northern part of the Eastern Shore. Geophysical exploration has been made mostly in the latter region; water wells here are generally not deep enough to give definite geological information. The Sun Co. made a magnetometer survey several years ago, seemingly the only geophysical work prior to last year. Last winter the Ohio Co. had a seismic crew in the area, and a well site was selected about 6 miles east of Salisbury. Since June the Pure Oil Co. has had a seismic crew at work in southern Delaware. More recently, the Shell Oil Co. undertook a gravimeter survey. - V. S.

8024. Yacimientos Petroliferous Fiscales (Argentina). Memoria de Y.P.F. correspondiente al año 1943 (Annual Report of the Argentine Administration of Government Oil Fields for 1943). Bol. Inform. Petrol., Buenos Aires, vol. 21, No. 242, 1944, pp. 23-25.

The Argentine Administration of Government Oil Fields (Y.P.F.) has issued s annual report for 1943. It contains a section on geophysical exploration. e latter describes, in usual form, the localities surveyed, methods employed, reage covered, and geological particulars. The material is organized by ovinces, comparisons are made with data for 1942, and a map of explored eas is appended. Geophysical surveys in 1943 generally continued the work previous years. (See Geophys. Abs. 115, No. 7214, and 120, No. 7902). - S.

25. Zanetta, A. J. La investigación y la industria petrolífera (Research and the Petroleum Industry). Bol. Inf. Petrol., Direccion General de Y.P.F., Buenos Aires, vol. 21, No. 241, 1944, pp. 11-30.

The author discusses the various applications of scientific research to e petroleum industry in Argentina. Among these applications he includes ophysical exploration. The seismic, gravitational, magnetic, geochemical, ectrical, and radioactive methods are briefly outlined. - V. S.

9. NEW PUBLICATIONS

26. Rinehart Oil News Co. of Oklahoma. Rinehart's Yearbook, 1945. Tulsa, Okla., Ira Rinehart Oil Report Publication (mim.), 1945, Price, $10.00.

The Rinehart's Yearbook of 1945 gives information on oil discovery and velopment during 1944 in 17 States: Texas New Mexico, Oklahoma, Kansas, ssissippi, Louisiana, Alabama, Georgia, Florida, Arkansas, Colorado, Wyoming, ntana, Nebraska, Missouri, Iowa, and South Dakota. The material is arranged states. It covers such subjects as new field discoveries, reviews of velopment, analysis of exploration, oil production, and extensions of old ols, as well as local problems. The data include statistics and numerous ps. Special attention is devoted to Mississippi's growth as an oil-oducing State. - V. S.

27. Van Tuyl, F. M., and others. Review of Petroleum Geology in 1944. Colorado Sch. Mines Quart., Golden, Colo., vol. 40, No. 2, 1945, 136 pp. Price $1.00.

The purpose of the review and the method of acquiring the information esented are discussed. The subject matter includes important news items d constructive developments in basic geology as well as in petroleum geolo- and borderline fields, as revealed by a search of the literature and the nvass of several leading workers in the petroleum industry. Only the more portant contributions to the literature of more than usual general interest e digested. Many other publications of more local interest are listed in e comprehensive bibliography at the end of the report. - Authors' abs.

10. PATENTS

8028. Master Control for Electric Seismographs. E. J. Shimek, Dallas, Tex., assignor, by mesne assignments, to Socony-Vacuum Oil Co., Inc., New York, N. Y., a corporation of New York. U.S. Reissue Patent 22,535, issued Aug. 22, 1944.

A method of recording seismic waves initially of high amplitude, thereafter of intermediate amplitude and finally of low amplitude, which comprises amplifying and recording the first of said high-amplitude waves, then substantially reducing the amplification and recording the remaining high-amplitude waves, thereafter increasing at a predetermined rate for a predetermined time the amplification and recording said waves of intermediate amplitude, and thereafter rapidly increasing the gain in amplification to a maximum and recording said seismic waves of low amplitude. - Claims allowed, 10.

8029. Vibration Detector. D. S. Muzzey, Jr., Houston, Tex., assignor to Shell Development Co., San Francisco, Calif., a corporation of Delaware. U. S. Patent 2,353,920, issued July 18, 1944.

In a system for detecting mechanical oscillations in a medium subject thereto by observing variations in an electric current responsive to said oscillations, an electrolytic cell adapted to be placed in contact with said medium, said cell confining an electrolytic liquid, two electrodes held in rigid relationship with regard to each other in contact with said liquid, one of said electrodes having a reduced area forming substantially a point contact with said liquid, said area being of the order of two thousandths of a square inch, and the other electrode having an extended area of contact with said liquid, and means for passing between said electrodes a direct current density increasing toward said first electrode. - Claims allowed, 1.

8030. Measuring Instrument and Method. O. S. Petty, San Antonio, Tex. U.S. Patent 2,357,356, issued Sept. 5, 1944.

In apparatus for measuring displacement of movably supported mass in response to gravity (gravimeter), the extent of such displacement being affected by temperature variation, the combination with a first condenser, the capacity of which is variable in response to displacement of said mass, of a second condenser of which the capacity is affected neither by gravity nor by temperature variation, a third condenser of which the capacity is unaffected by gravity but variable in response to temperature change, an electrical circuit of which the output is a measure of the capacity of a condenser included therein, and means for selectively including, as the condenser in said circuit, any one of the said condensers [illegible] 10.

31. Measuring Instrument. A. F. Hasbrock, San Antonio, Tex., assignor to O. S. Petty, San Antonio, Tex. U.S. Patent 2,357,822, issued Sept. 12, 1944.

In a force responsive instrument (gravimeter), the combination of a eldingly suspended member of means for restricting laterial and vertical splacement of said member during transportation of said instrument, said ans including a plurality of elements mounted for adjustment toward and ay from said member, said member having a plurality of surfaces inclined opposite directions at acute angles to the vertical and so positioned with spect to said elements as to engage the latter when said member is subjected displacement in excess of a predetermined minimum, each of said elements ing positioned for engagement with one only of said surfaces. - Claims lowed, 12.

32. Electrical Displacement Vibrometer. O. F. Ritzmann, Aspinwall, Pa., assignor to Gulf Research & Development Co., Pittsburgh, Pa., a corporation of Delaware. U.S. Patent 2,359,245, issued Sept. 26, 1944.

An electrical displacement vibrometer comprising a mass, a cantilever ring suspension for said mass, a pair of flexible resistance members concted in series and mounted on said spring suspension to bend in displacent of said mass and to vary the resistance of both in a similar manner. - aims allowed, 3.

033. Well Logging and Apparatus; Hart Brown and H. S. Ribner, Houston, Tex.; said Ribner assignor to said Brown. U.S. Patent 2,359,894, issued Oct. 10, 1944.

An apparatus for lowering into a well bore for well logging including two irs of vertically spaced inductors, the inductors of each pair being angurly spaced in two planes about a vertical line in the well, the coils in ch vertical plane being connected in series oppositon whereby two differenal potentials are induced in the coil groups, means for combining said tentials, and means for recording the resultant potential. - Claims allowed,

34. Gun Perforator. G. F. Turechek, Los Angeles, Calif., assignor to Lane-Wells Co., Los Angeles, Calif., a corporation of Delaware. U.S. Patent 2,360,024, issued Oct. 10, 1944.

A gun perforator comprising: a gun body defining at least one longitudilly extending ignition passage, a plurality of transversely extending gun res communicating with said passage, and a plurality of transversely rected cartridge bores also communicating with said passage; bullets for id gun bores; and cartridges and seal plugs for said cartridge bores. - aims allowed, 13.

8035. Apparatus for Recording Seismic Waves; J. P. Minton, Dallas, Tex., assignor to Socony-Vacuum Oil Co., Inc., New York, N. Y., a corporation of New York. U.S. Patent 2,360,507, issued Oct. 17, 1944.

In a system, for recording seismic waves which have been created in the earth's surface and detected at a plurality of stations by modulating a common high frequency carrier wave at the frequency of the seismic waves, having amplifiers for independently amplifying the resultant signals from each station and recording devices for producing independent traces of a seismogram, the combination of means for producing an output signal for recordation on a trace of said seismogram which is a composite signal from a group of said stations comprising a balanced bridge full wave rectifier in each amplifier circuit in said group, an output circuit, means connecting said full wave rectifiers in parallel with each other and with said output circuit, means for filtering the carrier wave from the mixed composite signal applied to said output circuit, and means for applying said composite signal to one of said recording devices for recordation on a trace of said seismogram. - Claims allowed, 5.

8036. Depth Measuring Apparatus; Marcel Schlumberger, Haute-Garonne, France, assignor, by measne assignments, to Schlumberger Well Surveying Corp., Houston, Tex., a corporation of Delaware. U.S. Patent 2,361,064, issued Oct. 24, 1944.

In depth determining apparatus, a signalling device comprising a frame adapted to be lowered into a borehole, a flexible casing in the frame, switching means having spaceable switch contacts in the casing, one of said contacts being grounded to said frame, a single insulated conductor connected to another of said contacts and grounded at the surface of the earth, a source of electrical energy for energizing the circuit including said conductor, means responsive to the current flow in said circuit, and an actuator for said switching means, said actuator extending downwardly from the frame and being adapted to operate said switching means when it engages a solid object. Claims allowed, 7.

8037. Radiological Exploration System; A. M. Cravath, San Francisco, and G. L. Hassler, Berkeley, Calif., assignors to Shell Development Co., San Francisco, Calif., a corporation of Delaware. U.S. Patent 2,361,274 issued Oct. 24, 1944.

In an apparatus for the radiological surveying of boreholes, a housing adapted to be lowered into a borehole, said housing comprising an ionization chamber, an electrostatic alternator comprising stator and rotor plates, and an amplifier tube, the grid of said tube forming a system of limited electrostatic capacity with one plate of said alternator and the collecting electrod of said chamber, means for supplying to said chamber and said tube an operating voltage, means for periodically varying the capacity of said system by displacing the plates of said alternator with regard to each other, potentiometer means connected between the other plate of said alternator and the other

ectrode of the ionization chamber for balancing out the effect of fluctua-
ons of the supply voltage on said alternator by applying a potential pro-
ortional to said fluctuations between said alternator plates, and means for
ndicating the plate current of said amplifier tube. - Claims allowed, 4.

38. Well Survey Method and Apparatus; R. E. Fearon, Tulsa, Okla., assignor to Well Surveys, Inc., Tulsa, Okla., a corporation of Delaware. U.S. Patent 2,361,389, issued Oct. 31, 1944.

In an apparatus for geophysical exploration within a well bore by the
se of an ionization chamber arranged to control the magnitude of a very small
ubstantially continuously flowing electrical current in response to the
ntensity of the radiations impinging upon it, the improvement which comprises
eans to apply a periodically varying capacity to a voltage resulting at least
n part from the current in the ionization chamber, an amplifier controlled
the pulsating voltage which results, and recording means controlled by the
tput of said amplifier to record the current in the ionization chamber. -
aims allowed, 30.

39. Seismic Surveying; O. S. Petty, San Antonio, Tex. U.S. Patent 2,361,648, issued Oct. 31, 1944.

A system of recording artificial seismic waves of varying amplitude on a
ecord strip of limited uniform width comprising a seismometer for converting
id seismic waves into electrical wave form energy, a thermionic valve ampli-
er for said electrical wave form energy, and a recorder operable by the
tput of said amplifier, said amplifier including at least one resistance
upled stage having a coupling condenser and a grid resistor, the capacity
d resistance of said condenser and resistor respectively being such that
e major portion of the charge impressed on said condenser by high amplitude
ves is discharged through said resistor over a period of not substantially
ss than one-half second. - Claims allowed, 2.

40. Leveling Device for Gravimeters; P. H. James, Houston, Tex., assignor to R. H. Ray, Inc., Houston, Tex., a corporation of Texas. U.S. Patent 2,362,135, issued Nov. 7, 1944.

In an apparatus of the class described the combination of a device to be
veled, hydraulically operable means controlled from a remote position for
ving said device to a level position, means for indicating the level posi-
on of the device and inclination from such position, said last mentioned
ans comprising a housing, an inverted pendulum mounted in said housing to
lt when the housing is moved from a level position, and indicating means
erable to indicate when the instrument is level and to indicate the direction
tilt when the instrument is tilted. - Claims allowed, 5.

8041. Radioactivity Logging; Daniel Silverman, Tulsa, Okla., assignor to Stanolind Oil & Gas Co., Tulsa, Okla., a corporation of Delaware. U.S. Patent 2,362,164, issued Nov. 7, 1944.

A method of determining the radioactivity of the material forming the walls of a well including the steps of lowering into said well to each of a plurality of known depths an ionization chamber containing an inert gas at superatmospheric pressure and at least two insulated electrodes, intermittently discharging a charged condenser through said electrodes adjacent said chamber, said discharge varying in accordance with the radioactivity of said material, recharging said condenser to a predetermined maximum potential after each such discharge, producing a pulsating electric signal by said intermittent charging and discharging of said condenser, one characteristic of which varies with said intermittent discharge through said electrodes, and measuring the variation in said characteristic of said signal as said chamber is lowered to each of said known depths. - Claims allowed, 11.

8042. Well Testing Apparatus; M. C. Johnson, Winterset, Iowa. U.S. Patent 2,363,793, issued Nov. 28, 1944.

A device adapted to be lowered into a deep well by means of a measuring cable to obtain a sample of the fluid in the strata of the wall of the well a a predetermined depth, comprising a receptacle having an inlet opening in one side near its upper end, a yieldable nipple in said opening having one end projecting outwardly from said side and adapted to engage the adjoining side wall of said well, power actuated means for forcing said receptacle laterally to cause said nipple to engage said wall and to seal said opening against drilling fluids, a valve for said inlet opening, yieldable means maintaining said valve in a closed position, power actuated means for opening said valve, and remote controlled means for each of said power means controlling each of said power means independently. - Claims allowed, 7.

8043. Apparatus for Electrical Exploration; D. S. Muzzey, Jr., and R. Du Wayne Miller, Houston, Tex., assignors to Shell Development Co., San Francisco, Calif., a corporation of Delaware. U.S. Patent 2,363,987, issued Nov. 28, 1944.

In a system of electrical exploration, a commutator circuit comprising arc discharge tubes, a source of direct current connected to said circuit, a source of controlled frequency voltage pulses connected to said circuit, grounded current electrodes connected to said circuit, means for discharging said tubes by applying thereto said voltage pulses, whereby the direction of the current flowing between the current electrodes is reversed, an indicating device, grounded potential electrodes connected to the terminals thereof, first relay means actuated by said voltage pulses for reversing the connectio between the potential electrodes and the indicating device in synchronism wit the reversals of the current flowing between the current electrodes, and second relay means actuated by said voltage pulses to shortcircuit said indicating device during the current reversal periods. - Claims allowed, 3.

3044. Apparatus for Electrical Bore Logging. Gary Muffly, Penn Township, Allegheny County, Pa., assignor to Gulf Research & Development Co., Pittsburgh, Pa., a corporation of Delaware. U.S. Patent 2,364,159, issued Dec. 5, 1944.

A bore logging apparatus comprising in combination two pairs of current electrodes adapted to be placed in current conductive relation to the earth adjoining a bore, two alternating current generating means one connected to each electrode pair and supplying thereto currents of different frequencies, a pair of pick-up electrodes in current conductive relation to the earth adjoining the bore and at least one of which is adapted for positioning at various levels within the bore, filtering means connected to the pick-up electrodes and tuned to exclude all applied frequencies, and alternating current potential exhibiting means connected to said filtering means, the potentials measured thereby being those created from applied potentials by modulation at the strata interfaces. - Claims allowed, 1.

8045. Seismic Prospecting. W. G. Green, Tulsa, Okla. U.S. Patent 2,364,209, issued Dec. 5, 1944.

A system for conducting geophysical exploration comprising a transmitting station and a receiving station, said transmitting station containing an impulse generating means, said means being adapted to transmit an impulse through two separate channels, an oscillator, a modulator having its input terminals connected to one of said channels and to said oscillator whereby said modulator produces across its output terminals a carrier wave having the frequency of said oscillator and modulated by the impulse derived from said means, a generator of seismic waves connected to the output terminals of said modulator, said generator being imbedded in the ground and adapted to set up variations therein, whereby seismic waves may be sent through the earth, said receiving station comprising a receiving means imbedded in the ground at a convenient distance from said generator and a recording galvanometer, said galvanometer having one pair of its input terminals connected to said receiving means for recording its output and having another pair of its input terminals connected to the other of said channels for recording the instant of initiation of said impulse. - Claims allowed, 4.

8046. Geophysical Exploration. H. H. Pratley, Glendale, Calif.; California Trust Co. executor of said H. H. Pratley, deceased. U.S. Patent 2,364,655, issued Dec. 12, 1944.

The method of locating a body, such as an ore body, or the like in a predetermined region of limited boundaries and of substantially uniform seismic characteristics except for the presence of such bodies, which comprises the steps of generating seismic waves by a single disturbance at a selected generating point on one side of said generating region, receiving said seismic waves at a plurality of spaced reception points on the opposite side of said region, the reception points being so disposed that some of them may be located in the shadow of said body and others may be located outside the shadow of said body, making records of the seismic waves received at each of said reception points on a multiple record sheet, the several records having time and shape characteristics, and determining from said records whether a body is present and the limits of such body. - Claims allowed, 7.

8047. Apparatus for Seismograph Prospecting. C. F. Ritzmann, Aspinwall, Pa. assignor to Gulf Research & Development Co., Pittsburgh, Pa., a corporation of Delaware. U.S. Patent 2,364,755, issued Dec. 12, 1944.

In a seismograph prospecting apparatus including a series of detector means spaced in the earth at different distances from a source of seismic waves, amplifiers coupled to each of the detector means, the amplifiers having elements which control a characteristic of the amplifier in accordance with the magnitude of energy supplied to the control element, and exhibitor means responsive to the amplified energy transmitted from each detector means the improvement comprising a control energy channel which diverts a portion of the signal energy from one of said detector means, which is located at a position nearer to the source than other detector means, means for amplifying and rectifying the diverted energy and means for applying the amplified rectified energy to the control element of at least one amplifier which is connected to detector means spaced farther away from the source; said control channel being so constituted as to delay the change in control energy at said element, upon change in signal energy output of said first detector means, for a period of time not greater than the interval between receipt of a given seismic wave at said near detector and receipt thereof at said amplifier connected to said farther detector. - Claims allowed, 7.

8048. Analysis Method for Geochemical Exploration. G. L. Hassler, Berkeley, Calif., assignor to Shell Development Co., San Francisco, Calif., a corporation of Delaware. U.S. Patent 2,364,898, issued Dec. 12, 1944.

In a method for analyzing a sample of formation water for the presence therein of extremely small quantities of hydrocarbons, the steps of confining said sample in a closed reservoir partially filled therewith, continuously withdrawing the gaseous phase from the space above the liquid level in said reservoir, passing said gaseous phase through a closed circulatory system while converting the hydrocarbons in said gaseous phase to carbon dioxide by combustion, removing the carbon dioxide from said gaseous phase by passage through an electrolyte capable of reacting therewith to form a carbonate, and determining the amount of the carbon dioxide reacted with said electrolyte by indicating the change in the specific conductivity of said electrolyte, continuously returning the gaseous phase freed from its hydrocarbon content to said reservoir, passing said gaseous phase through the liquid in said reservoir, whereby further hydrocarbons contained in said liquid are caused to pass to said gaseous phase, and continuing the recirculation of said gaseous phase until a complete conversion of said hydrocarbons to carbonates is effected and indicated by the steady value reached by the conductivity of said electrolyte. - Claims allowed, 2.

3049. Electrical Surveying. Norvel Douglas, New Rochelle, N. Y., assignor to Stanolind Oil & Gas Co., Tulsa, Okla., a corporation of Delaware. U.S. Patent 2,364,957, issued Dec. 12, 1944.

Apparatus adapted for geological exploration in bore holes extending from the surface into the earth, including in combination, a drilling tool comprising a drill collar and a drill bit, said collar serving to encase a plurality of oscillators electrically coupled on two terminals, one of said terminals being connected to an exploring electrode insulated from and secured near the end of said tool, and the other terminal being connected to the portion of said tool which extends to the surface, means associated with a first one of said oscillators causing the frequency thereof to vary over a first frequency range when said electrode traverses strata having various impedance characteristics, means associated with a second one of said oscillators causing the frequency of said second oscillator to vary over a second frequency range when said electrode traverses strata having various earth-potential characteristics, and means associated with each oscillator preventing oscillating potentials generated by any of said oscillators impressed across said terminals from influencing the frequency of any of said oscillators. - Claims allowed, 9.

3050. Determining Permeability of Geologic Structures. J. J. Heigl and L. R. Hodell, Tulsa, Okla., assignors to Standard Oil Development Co., a corporation of Delaware. U.S. Patent 2,364,975, issued Dec. 12, 1944.

A method for determining the permeability of the various strata penetrated by a borehole comprising the steps of incorporating radioactive material with drilling fluid used in drilling the borehole and subsequently using an electronic method to determine the concentration of the radioactive material along the bore of the hole. - Claims allowed, 6.

3051. Seismic Surveying; O. S. Petty, San Antonio, Tex. U. S. Patents 2,365,289, issued Dec. 19, 1944.

The method of maintaining substantial uniformity of deflection in a galvanometer having an electromagnetic field wherein the energy responsible for deflection is decreasing at a relatively uniform rate comprising, applying said energy and simultaneously energizing said field and providing said field with such self-inductance that its magnetic field builds up at a rate of the same order as the decrease of the deflecting energy. - Claims allowed, 5.

8052. Well Logging Device. B. J. Kalb and D. H. Wise, Houston, Tex.; said Wise assignor to said Kalb. U.S. Patents 2,365,763, issued Dec. 26, 1944.

A device of the class described comprising a container, a conductor cable for supporting and moving the container within a borehole and for conducting electric current between the container and the mouth of the borehole, a source of radioactive emanations within the casing, a shield surrounding said source, said shield having outwardly directed passages to direct radient energy into the formations surrounding the borehole, an ionization chamber within the casing, and quanta measuring means at the mouth of the borehole, said last mentioned means and the ionization chamber being connected to said conductor cable so that the quanta of evergy entering the ionization chamber will be indicated by said means. - Claims allowed, 3.

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CORRECTION: In Geophysical Abstracts 120, p. 10, No. 7811, the expression "les perturbations magnetiques en baie" is more properly translated as "magnetic bays". - V. S.

C. 7349

May 1946

UNITED STATES
DEPARTMENT OF THE INTERIOR
J. A. KRUG, SECRETARY

BUREAU OF MINES
R. R. SAYERS, DIRECTOR

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GEOPHYSICAL ABSTRACTS 122

JULY - SEPTEMBER 1945

COMPILED BY

V. SKITSKY

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y 1946.

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UNITED STATES DEPARTMENT OF THE INTERIOR - BUREAU OF MINES

GEOPHYSICAL ABSTRACTS 122
July - September 1945[1]

Compiled by V. Skitsky[2]

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FOREWORD

Geophysical Abstracts 1 - 86 were issued in mimeographed form by the ureau of Mines; Abstracts 87 - 111 were published in bulletins of the Geolog- al Survey; Abstracts 112 - 121 were issued in mimeographed form by the Bureau f Mines as Information Circulars 7256, 7257, 7267, 7373, 7385, 7292, 7303, 310, 7324, and 7338.

/ The Bureau of Mines will welcome reprinting of this paper, provided the following footnote acknowledgment is used: "Reprinted from Bureau of Mines Information Circular 7349."

/ Physical science analytical editor, Bureau of Mines, U. S. Department of the Interior.

1. GRAVITATIONAL METHODS

8053. Andreev, B. A., Zakashanskii, M. S., Samsonov, N. N., and Fotiadi, E. E. A Textbook of Gravitational Surveying (in Russian). Gosgeolizdat, Moscow-Leningrad, 1941, 432 pp.

This textbook was written at the suggestion of the faculty of geophysical exploration of the Leningrad Mining Institute. It contains two parts: (1) Theory and technique, and (2) Applications to geology and exploration. The features bringing the text up-to-date include: (a) Description of the principal modern gravimeters; particular attention to the method of simultaneous oscillation of 4 pendulums; (b) discussion of the aperiodic oscillation of torsion balances; outline of the construction of variometers Z-20 and Z-40; (c) material for aid in interpretation, such as reference-charts, formulas with their derivation, atlas of theoretical curves, and examples of interpretative calculations; (d) considerations in the planning of surveys and the densities of various rocks; and (e) detailed analysis of significant examples. The text is provided with a bibliography. - V. S.

8054. Billot, Henri. Influence exercée par un champ magnétique longitudinal sur les oscillations de torsion d'un fil de nickel (The Influence Exerted by a Longitudinal Magnetic Field Upon the Torsion Oscillations of a Thread of Nickel). Compt. rend. Acad. Sci., Paris, vol. 218, No. 11, 1944, pp. 453-454.

A study was made of the influence exerted by a longitudinal magnetic field upon the oscillation and damping of a torsion balance equipped with a ferromagnetic torsion thread. (1) The oscillator comprised a nickel thread 35 cm. long, placed vertically along the axis of a solenoid 50 cm. long and 5.5 cm. in diameter. This thread supported a carriage 1 kg. in weight. The initial oscillations were set at 30°. In such an instrument the damping of oscillations varies with the intensity of the induction field. (2) It was discovered that, when the induction intensity H is increased, the logarithmic decrement, δ, at first increases, passes a maximum at H = 80 gauss, and then decreases. On the other hand, when the induction intensity H is decreased, the logarithmic decrement undergoes a variation which is not the reverse of the first variation. In the absence of a magnetic field the period shows a very slight variation. The coefficient of interior friction for nickel is, apparently, magnetic in nature. (3) These findings lead to the conclusion that the magnetic field influences the torsion oscillations of a nickel thread by causing a variation in its inner friction. - V. S.

8055. Boletin de Informaciones Petroleras. Y.P.F. inicia estudios de exploración en la provincia de Buenos Aires (Y.P.F. Initiates Exploratory Studies in the Province of Buenos Aires). Direccion General de Y.P.F., Buenos Aires, vol. 21, No. 241, 1944, p. 75.

Three geophysical parties have been sent by the Argentine Administration of Government Oil Fields (Y.P.F.) to the Buenos Aires province, in accordance ith arrangements made in December 1943: (1) One party with torsion balances, o the Rio Salado and Ensenada de Samborombón; (2) one party with a gravi- eter, to the south and east of Bahía Blanca; and (3) one party with seismic efraction equipment, to the west of Bahía Blanca. The exploration assign- ents are briefly indicated. - V. S.

8056. Bridgman, P. W. Polymorphic Transitions and Geological Phenomena. Am. Jour. Sci., New Haven, Conn., vol. 243-A (Daly volume), 1945, pp. 90-97.

Polymorphic transitions have been observed by the author in the labora- ory under a wide range of conditions. In the last few years the pressure ised for the observations was extended to 50,000 kg./cm.^{2} and higher. A sta- istical examination of the results is now undertaken, and findings for dif- erent types of transition are described. The conclusion is reached that ransitions, even those having a volume change too small to be important in ther connections, may play an important role in isostatic adjustments. -V.S.

8057. Closs, H. Gravimetrische Überlegungen zum geologischen Profil der Thermalbohrung von Heidelberg (Gravimetric Considerations Regarding the Geological Profile of the Hot-Spring Borehole in Heidelberg). Oel und Kohle, Berlin, vol. 39, Nos. 43/44, 1943, pp. 942-951.

The hot-spring borehole in Heidelberg, Germany, is of interest to geo- physicists because this locality has very low gravity values. The region had een previously investigated by means of gravimetric and torsion-balance sur- veys. The author utilizes the torsion-balance profiles and a geological pro- file. He also obtains volumetric-weight profiles by sampling cores in two adjacent oil wells; the problems of such profiling are discussed. The com- bined material serves for calculating the gradient profiles of the hot-spring area. The results are embodied in cross-sectional diagrams. Further geo- physical and geological information is taken into consideration for the inter- pretation, such as regional gravity trends, the local characteristics of the Tertiary, etc. The findings are discussed in their geological and oil-bearing aspects. - V. S.

8058. Dubiago, A. D. Regarding the Integration of Gradients of the Force of Gravity (in Russian). Bull. Acad. Sci. U.R.S.S. (Izvestiia), Moscow, Sér. Géogr. Géophys., vol. 8, No. 1, 1944, pp. 25-34.

Gravity maps are prepared on the basis of gravimeter or variometer mea- surements. The author deals with the treatment of variometer data preliminary to map making. He indicates briefly the limitations of variometer observa- tions (see also Geophys. Abs. 121, No. 7935). Then he examines critically the mathematical theory and methods of integration of variometer gradients. The reductions for the normal field of the earth and for the local variations of topographic relief are considered. In the light of these discussions, an analysis is made of the effects of the current standard methods of integra- tion upon the gravity results. A formula is deduced for the error involved in ordinary linear integration of gradients in "free air". The possibilities of nonlinear integration of gradients are briefly considered. - V. S.

8059. Gunn, Ross. The Mechanics of the Lithosphere and Its Relation to Gravity Anomalies and Fracture. Nat. Research Council, Am. Geophys. Union, Trans. 1944, pt. IV, Washington, D. C., 1945, pp. 633-634.

The mechanics of the lithosphere are discussed in relation to gravity anomalies. Three fundamental assumptions of a rigid, plastic, and elastic lithosphere are distinguished. Consideration is then limited to a typical section of the lithosphere of unit width extending at right angles to the axis of an assumed linear earth feature. Equations are presented for the deformation of an equivalent unbroken beam supported by a weak magma and for the deflection of the lithosphere at any selected point. By solving these equations it is possible to determine the figure of the deformed lithosphere. With a knowledge of this figure and the relations expressed by the last equation, the principal term of the gravity anomaly Δ g can be evaluated as a function of its position. It thus becomes possible to forecast finite gravity anomalies in deformed regions of the earth's crust. It is also possible to compute the stress anywhere in the lithosphere, if the load applied and the lithospheric constant are known. - V. S.

8060. Jeffreys, Harold. Types of Isostatic Adjustment. Am. Jour. Sci., New Haven, Conn., vol. 243-A (Daly volume), 1945, pp. 352-359.

In view of the complexity of the force fields controlling isostatic adjustment, it is necessary to attack the problem by assuming relatively simple conditions which can only in part match those of nature. This paper gives the calculated results to be derived from each of two assumptions: That a surface load with the form of a long strip laid on the earth's surface causes lateral flow (a) in a deep viscous fluid, and (b) in a thin layer of viscous fluid which lies close to the original surface, that is, a layer resting between strong upper and lower layers. The results are indicated by figures and by the author's summary: "For flow in a deep layer the subsidence within the region will be greater at the center, and the strata for some distance outside it will be bent downwards. For flow in a thin, intermediate layer the subsidence within the region will be greatest just inside it and the strata outside it will be pushed upward to make room for the material expelled. In regions subject to great erosion the first hypothesis would give an anticlinal structure and the second a synclinal one; for regions of heavy deposition these relations would be reversed." The author concludes that "the evidence of gravity is not particularly favorable to either hypothesis." Doubts are expressed that "flow at small stresses (affecting rocks) can accumulate over long periods." - Publisher's abs.

8061. Kogbetliantz, E. G. Quantitative Interpretation of Maps of Magnetic and Gravitational Anomalies by Mathematical Methods. Quart. Appl. Mathematics, Providence, R. I., vol. 3, No. 1, 1945, pp. 55-75.

A new mathematical method of interpreting magnetic and gravitational maps s offered. It is based on the theory of potential, as the usual methods. But t does not make use of individual values, such as maxima, minima, zeros, in-lection points, etc. These values are untrustworthy for anomalies of medium nd small size which now become increasingly important in exploration. In-tead, the new method utilizes exclusively the average values and, in particu-ar, moment functions and moments of the observed quantity and of its square. he exposition of the method deals mathematically with the center of gravity nd first moments, the interpretation of the map of an anticline with the aid f moments, and the interpretation of a centered anomaly created by a salt ome. The method was applied by the author in France and Iran with good esults. - V. S.

062. Lambert, W. D. The International Gravity Formula. Am. Jour. Sci., New Haven, Conn., vol. 243-A (Daly volume), 1945, pp. 360-392.

The international gravity formula was adopted with a view to the future etermination of the figure of the earth by Stoke's formula and a comparison n a common basis of the results from gravity observations with those from stronomical leveling.

The gravity formula is developed from the constants of the international pheroid of reference; then the gravity formula resulting from an assumption f a fluid spheroid of reference of mass equal to that of the international pheroid is developed and discussed. The conclusion that the departure from he results of the international formula would be slight is illustrated by umerical examples.

There is some discussion of the so-called Bruns term or effect and of he controversy occasioned by Hopfner's revival of Bruns' ideas. The Bruns ffect was, in fact, considered by Stokes and is taken account of in Stoke's ormula.

A longitude term is developed by means of spherical harmonics. It seems o be real, but there are too few data to permit an accurate determination of he coefficients. Various hypotheses advanced by prominent geodesists are tated and the implications to be drawn are discussed in some detail. - uthor's abs.

063. Lomaev, G. Z. The Augmentation Coefficient of the Inclination Gauge Equipped with Zöllner's Weight (in Russian). Akademiia Nauk S.S.S.R., Trudy Seismologicheskogo Instituta, Moscow, No. 106, 1941, pp. 17-20.

When a horizontal pendulum equipped with Zöllner's weight is used for easuring inclination, its augmentation coefficient tends to change, because he angle of the pendular axis to the vertical changes. There are two methods f determining the exact value of this coefficient: (1) An experimental ethod uses the period of free pendular oscillations devoid of damping. Here he coefficient is computed in terms of acceleration of gravity, length of he pendulum, constant π, and period of oscillation. The period must be de-ermined experimentally by means of filming or otherwise, and it may not be ufficiently accurate. The computations are described. (2) A theoretical method uses mathematical analysis. The coefficient is here computed exclusively in terms of generalized values and may fail to account for local peculiarities of the site of measurement. The mathematical derivation is described. - V. S.

8064. Neumann, G. Regionale Drehwaagemessungen an der Golfküste von Texas (Regional Torsion-Balance Measurements on the Gulf Coast of Texas). Beitr. angew. Geophys., Leipzig, vol. 9, 1942, pp. 234-268.

During 1934-38 the area of the Gulf coast of Texas between Matagorda Bay and the Texas hinterlands has been surveyed with torsion balance. Some 4,800 stations were occupied. The gravity results are compared with those of previous measurement at some 2,000 stations. Interpretation draws on these and some other regional data. It is found that oil-bearing structures tend to form separate and distinct zones. Further, a gravity maximum between Matagorda and Galveston Bay is compared with gravity anomalies in Schleswig-Holstein, Germany. The conclusion is drawn that torsion balance is equally well suited to the different oil regions of the world. - V. S.

8065. South African Mining and Engineering Journal. The Search for Free State Gold. Johannesburg, vol. 55, pt. 2, No. 2704, 1944, pp. 329-331.

The discovery of Western Holdings Co.'s new potential gold fields in the Orange Free State was achieved mainly by the use of the Eötvös torsion balance. The number of torsion-balance stations completed was close to 20,000. Magnetic surveys also were made. This combined exploration indicated that the area was underlain by the Witwatersrand system and that it was gold bearing. The first borehole, reported in 1939, was sunk in the Odendaalscrust area and encountered promising values. - V. S.

2. MAGNETIC METHODS

8066. Althausen, O. N. The Determination of the Magnetic Field of the Earth for Various Geological Epochs (in Russian). Bull. Acad. Sci. U.R.S.S. (Izvestiia), Moscow, Sér. Géogr. Géophys., vol. 8, No. 6, 1944, pp. 385-392.

The magnitude and direction of the magnetic field of the earth change with time. The author offers a method for determining these changes for different geological epochs by measuring the magnetic remanence of rocks. As an example, he describes his investigation in the area of the Teisk magnetite deposit. Measurements were made of thermoremanence and of other magnetic properties in magnetite samples subjected to cooling through the Curie point under the influence of magnetic fields of different intensity. A relationship was sought between the magnitude of remanence and the intensity of the field. The preparation of samples and the technique of measurement are described. The methodological requirements as to the selection of rocks for measurement are discussed in the light of the nature of remanent magnetis he results obtained have shown that, with proper samples, remanence changes rovide a suitable basis for determining the intensity of the magnetic field t the time of the cooling of rocks. - V. S.

067. Athanasiu, G. Nouvelles mesures de magnétisme terrestre en Transylvanie (New Measurements of Terrestrial Magnetism in Transylvania). Bull. Fac. Sti. Cernauti, vol. 12, 1939, pp. 129-145.

In 1936-38 the author made absolute measurements of terrestrial magnetic declination and horizontal intensity in Transylvania, in the region which . Eötvös explored in 1912-13. 33 stations were covered. The instruments for measuring horizontal intensity had been subjected to preparatory tests which are described. Time corrections were introduced on the basis of observations made at the magnetic observatory at Ogyalla, Hungary. The results are presented and discussed. They confirm the pronounced anomaly discovered and studied by Eötvös. - V. S.

3068. Blum, V. J. A Magnetic Survey of the Canon City Area. Nat. Research Council, Am. Geophys. Union, Trans. 1944, pt. IV, Washington, D. C., 1945, pp. 556-558.

A magnetic survey was made in the area of Canon City, Colo. It aimed at determining magnetic distribution for the well-known local structures and diverse rock types. The Schmidt (Askania) vertical field balance was used; the number of magnetic stations per square mile averaged 3.4. The principal results are embodied in a contour map showing the intensity distribution of the vertical component in relation to both subsurface and terrain features: (1) A long, narrow "low" extends along the northern base of the Wet Mountains; a vertical fault is found toward the west end of this low. (2) Magnetic "highs" in the northwest correlate with the amply exposed pegmatitic dikes. (3) The difference in readings between the crest and the base of a mountain near Canon City is over 3,000 gammas; the rate of change in magnetic intensity increases with elevation. Still other features of the map are described. The conclusion is drawn that, in correlating magnetic anomalies, the surface terrain must be considered to be as much of a factor in the earth's magnetic field as the subsurface structures and lithology. - V. S.

3069. Digiesi, Domenico. La carta magnetica d'Italia della componente orizzontale al 1940.0 edita recentemente dall'Istituto geografica militare (The Magnetic Map of Italy for the Horizontal Component Observed for epoch 1940.0, Edited Recently by the Military Geographical Institute). Geofis. pura appl., Messina, vol. 4, 1942, pp. 67-81.

The Military Geographical Institute, Italy, has recently published a magnetic map of Italy for the horizontal component of the terrestrial field, showing isodynamic lines for the epoch 1940.0. This map is reproduced on a reduced scale 1 : 4,000,000, and the method of practical determination of horizontal components is discussed. An example of observations employing the values obtained at the basic Italian stations is presented. - V. S.

8070. Fleming, J. A. Researches in Terrestrial Magnetism and Electricity at Department of Terrestrial Magnetism, Carnegie Institution of Washington, During April, 1943, to May, 1944. Nat. Research Council, Am. Geophys. Union, Trans. 1944, pt. IV, Washington, D. C., 1945, pp. 584-588.

Notwithstanding exacting war work, many organizations of the Department have continued, at least in part, their ordinary observations on land, so that the continuity of these data was not totally interrupted. But observations at sea were precluded by naval operations, and isomagnetic charts could not be maintained. Some compensations were gained from investigations of war problems which yielded many items of scientific value. The reviewed activities of the Department are grouped under the following headings: (1) Geomagnetic investigations, (2) geoelectric investigations, (3) observatory and field work, and (4) publications. - V. S.

8071. Gassmann, Fritz. Magnetische Messungen an alpinen Erslagerstätten (Magnetic Measurements at Alpine Ore Deposits). Verh. Schweiz. naturforsch. Ges., Geneva, No. 100, 1941.

The iron-ore deposits of Mont Chemin near Martigny, Switzerland, have been surveyed magnetically in 1936-38. Measurements were made of vertical and horizontal intensity. Moreover, magnetic susceptibility and the direction and magnitude of remanence were determined for uniform ore samples by means of a variometer. The findings of the survey have been subsequently confirmed in the course of mining. The confirmation of the location of the ore lenses was more satisfactory than that of the volume of the lenses. It is proposed to apply the method of magnetic susceptibility and remanence determinations in other surveys. - V. S.

8072. Harrison, E. P., and Smith, E. H. A New Method of Measuring the Inclination of the Earth's Magnetic Field. Pro. Phys. Soc., London, vol. 56, pt. 1, No. 313, 1944, pp. 31-47.

The instrument is based on the increase in impedance, due to the skin effect, caused by a decrease in axial component of magnetic field in a wire of high-permeability nickel-iron when carrying alternating current. Four straigh wires of similar characteristics are arranged accurately in a square, and form the four arms of an A.C. bridge. If the plan of the assembly lies in the magnetic meridian plane and is then rotated about a horizontal axis it is evident that when the total field vector lies in one of the diagonals of the square the bridge automatically balances and the angle between the diagonal and the horizontal plane is the angle of dip. Such an "all-magnetic" bridge needs no ancillary balancing adjusters. In the instrument the four wires are mounted as a square assembly in a disk, which is itself mounted in a ring within which it can rotate about an axis lying in one of the diagonals of the square. The ring is supported in a base block in such a manner that by means of a worm and micrometer head the whole ring (carrying the disk) can be rotated about an axis through its centre, perpendicular to the plane of the ring. The instrument, owing to its inherent geometrical simplicity, eliminates errors due to: (a) want of perfect match of the wires; (b) inaccuracy of geometric mounting of the wires; and (c) the vertical axis not being normal to the base plane. The value of the dip is independent of the adjustment of the electrical unit, provided this does not occur between the times of the direct and reversed readings necessary to a determination of the dip. - Authors' abstract.

8073. Howe, H. H. Analysis of Magnetometer-Deflections (Abs.) Nat. Research Council, Am. Geophys. Union, Trans. 1944, pt. IV, Washington, D. C., 1945, pp. 541-543.

An analyses is made of the relations existing between different deflections of a magnetometer. Knowledge of these relations makes it possible to detect blunders and to estimate the quality of observations. The types of deflections considered are: (1) Deflections at one distance; (2) two distances; (3) three or more distances; (4) one distance, at two different times; (5) two distances, at two different times; and (6) two distances erect and two distances inverted. Other cases will be considered later. For the purpose of discussion, any play in the stops on the deflection bar is assumed to be always taken up by pushing equally hard in a specified direction. Thus, the amount by which the magnetic center of the magnet is displaced by reversal of the magnet is the same, irrespective of which stop is used. As regards the accuracy of observations, it appears that a constancy within about 2' may be expected for a quantity that involves the sum or difference of eight circle readings. - V. S.

8074. Johnston, H. F. American Magnetic Character-Figure, C_A, Three-Hour-Range Indices, K, and Mean K-Indices, K_A, for January to March, 1945. Terrestrial Magnetism and Atmospheric Electricity, Baltimore, Md., vol. 50, No. 2, 1945, pp. 131-134.

Tables are given with explanatory text. - V. S.

8075. Kalashnikov, A. G. Magnetic Properties of Sedimentary Rocks (in Russian). Bull. Acad. Sci. U.R.S.S. (Izvestiia), Moscow, Sér. Géogr. Géophys., No. 3, 1941, pp. 317-343.

The magnetic properties of sedimentary rocks were investigated by the method of the torsion balance of Faraday-Curie. A development of this method by the author made it possible to produce a cyclic magnetization of rocks. As a result, variation of magnetic susceptibility in dependence on the intensity of the field was established for all rocks investigated relating to the Carbon and the superior and median Devonian periods. During the magnetization of a number of rocks with very weak magnetic properties the phenomenon of hysteresis was observed. The findings obtained for a group of sedimentary rocks are used for classifying rocks into fundamental magnetic types. Suggestions are advanced regarding a utilization of the magnetic properties of sedimentary rocks for the solution of geological problems. - Author's abs., translated by V. S.

8076. Knapp, D. G. Curiosities of Magnetographs. Nat Research Council, Am. Geophys. Union, Trans. 1944, pt. IV, Washington, D. C., 1945, pp. 537-540.

Innovations in magnetograph recording have had curious effects on the resulting records. Examples of such innovations in variometer operations are described with regard to instruments, effects, and interpretation. They deal with the use of a variable-width vertical slit in front of a horizontal filament, elimination of ghost traces by means of circular mirrors, a reverse spot produced by two mirrors for recording the reduced values of H during magnetic storms, etc. The variometers and recorder of the Eschenhagen magnetograph are used as illustrations. - V. S.

Kogbetliantz, E. G. Quantitative Interpretation of Maps of Magnetic and Gravitational Anomalies by Mathematical Methods. Quart. Appl. Mathematics, Providence, R. I., vol. 3, No. 1, 1945, pp. 55-75. (See abs. 8061 in this issue.)

8077. Lee, F. W., Swartz, J. H., and Hemberger, S. J. Magnetic Survey of the Florida Peninsula. Bureau of Mines Rept. of Investigations 3810, May 1945, 49 pp.

This investigation was undertaken in 1939 for the purpose of securing the necessary information relating to the field techniques and accuracy that would be needed for magnetically surveying Statewide areas. The Florida peninsula was chosen for such a study for two reasons: First, because it is geologically ideal for such an investigation, since it comprises a series of unconsolidated, flat-lying Tertiary and Cretaceous sediments of low magnetic susceptibility covering a complex and much-folded crystalline basement composed of rocks carrying strongly paramagnetic materials; second, because information concerning the structural trends of the crystalline basement would be of great interest and importance in the study of Appalachian oregeny and the relationship of the Florida peninsula to both the Appalachian and Antillean tectonic systems. The results of this magnetic survey have clearly demonstrated that the magnetic anomalies reflect variations in the crystalline basement. To the degree which the structures of the crystalline basement control the structures of the overlying sediments these results are useful for oil exploration. - Authors' abs.

8078. Mikov, D. S. On a Special Nomogram for the Interpretation of Magnetic Anomalies (in Russian). Inform. Sbornik Zemn. Magnet. Elektrich., Leningrad-Moscow, No. 5, pt. 2, 1940, pp. 10-13.

The author proposes a special nomogram for the interpretation of magnetic anomalies arising from uniformly magnetized horizontal cylindrical bodies of any cross section and explains the use of this nomogram. - H. D. Harradon, Terrestrial Magnetism and Atmospheric Electricity, vol. 50, No. 2, 1945, p. 167.

79. Ogg, A., Gotsman, B., and Wijk, A. M. van. The Determination of the Horizontal Component of the Earth's Magnetic Force at the Magnetic Observatory, Hermanus, Union of South Africa. Trans. Roy. Soc. South Africa, Cape Town, vol. 30, pt. 2, 1944, pp. 121-134

The horizontal intensity (H) of the geomagnetic field was measured by
gnetometers of different types at the Hermanus observatory. A comparative
udy is presented of the results of these observations, with a tabulation of
ta. The magnetometers used were: (1) Inductor magnetometer of the Car-
gie Institution, Washington; (2) Schmidt standard theodolite magnetometer,
kania; (3) Helmholtz-Gaugain portable coil magnetometer, Cambridge; and
) La Cour quartz horizontal-force magnetometer. The paper discusses the
struments, deflection and oscillation experiments, methods of observation,
rrections for temperature and for variations of H, etc.; the underlying
thematics are included. The mathematical theory of the Schmidt magneto-
ter, which is not generally known, is presented, with a simplified method
using the instrument. - V. S.

80. Ogurskii, A. F. Investigation of the Influence of Electrified Railways on the Earth's Magnetic Field (in Russian). Inform. Sbornik Zemn. Magnet. Elektrich., Leningrad-Moscow, No. 5, pt. 2, 1940, pp. 55-59.

By registering the magnetic variations and the earth-currents at seven
fferent points at various distances from an electrified railway near Lenin-
ad, it was found that its influence is noticeable at a distance of 20-30
lometers. - H. D. Harradon, Terrestrial Magnetism and Atmospheric Electric-
y, vol. 50, No. 2, 1945, p. 167.

uth African Mining and Engineering Journal. The Search for Free State Gold. Johannesburg, vol. 55, pt. 2, No. 2704, 1944, pp. 329-331 (see abs. 8065 in this issue).

81. Swainson, O. W. Magnetic Work of the United States Coast and Geodetic Survey from April, 1943, through March, 1944. Nat. Research Council, Am. Geophys. Union, Trans. 1944, pt. IV, Washington, D. C., 1945, pp. 589-591.

During the year 1943-44 the Section of Geomagnetism, United States
ast and Geodetic Survey, continued to devote all its facilities to military
rvices. Among these, magnetic information for charts was foremost. The
rk of the section is reviewed under the following headings: (1) Magnetic
rveys; (2) work in the Office; (3) instrumental program; and (4)
servatories. - V. S.

82. Tamm, I. E. (Electric) Currents in the Ionosphere Producing Variations in the Earth's Magnetic Field (in Russian). Bull. Acad. Sci. U.R.S.S. (Izvestiia), Moscow, Sér. Phys., vol. 8, No. 2, 1944, pp. 30-41.

Three theories proposed to explain the mechanism of the origin of ionospheric currents causing daily variations of the earth's magnetic field are discussed. The theories of Gunn and Chapman are shown to be incorrect. Chapman's theory is then modified by taking into account the fact that the distribution of ions in the ionosphere is not an equilibriated one. Preliminary calculations indicate that in this new form the theory can explain the forces as well as the phase of ionospheric currents. - F. H. R., Chem. Abs., vol. 39, No. 5, 1945, p. 861.

8083. Vacquier, Victor. The Gulf Absolute Magnetometer. Terrestrial Magnetism and Atmospheric Electricity, Baltimore, Md., vol. 50, No. 2, 1945, pp. 91-104.

In response to the need for a more accurate method of measuring the vertical magnetic intensity in the field, voiced to me in 1938 by Capt. N. H. Heck, of the United States Coast and Geodetic Survey, the Gulf Research & Development Co. built an absolute magnetometer of new design for the determination of declination (D), vertical intensity (Z), and horizontal intensity (H). The declination is measured in the customary manner by means of a fiber-suspended magnet. The intensity-measurements are made by comparing the field of a Helmholtz coil with the component of the earth's field that is to be measured. H is obtained by the sine-galvanometer method. The zero-field detecting device for Z is a special vertical field-balance in which the polarity of the magnet can be reversed by discharging a condenser through magnetizing coils fastened to the case. The effect of residual mechanical unbalance is thus made to disappear from the average of two sets of observations taken with the magnet oppositely polarized. The Helmholtz coil-constant for the Z-magnet is determined by suspending the Z-magnet in the sine-galvanometer housing, and comparing the value of H so obtained with an observatory base-lin

From preliminary tests at Cheltenham in April, 1940, the declination-error was 1.'6. The precision of the intensity-measurements is limited entirely by the stability of electrical standards in the field. This is estimated to be between 0.01 and 0.02 per cent. Six standard cells, two standard resistors, and one Rubicon potentiometer comprise the electrical measuring equipment. The determination of Z on the basis of the Cheltenham base-line for H and the electrical equipment of the CIW sine-galvanometer No. 1 was 17 gammas greater than the Cheltenham base-line for Z. This discrepancy can be accounted for either by pier-differences or by a magnetic impurity in the construction of the Z-balance. The tests were interrupted by the war. Since little remains to be done to the instrument, it is hoped that it will be made ready for the postwar observational program at an early date. - Author's abs.

3. SEISMIC METHODS

8084. Beach, F. K. Shell Jumpingpound Well Discovers Major Field. Petrol. Eng., Dallas, Tex., vol. 16, No. 6, 1945, pp. 94-101.

The Shell Oil Co. of Canada has discovered an oil field in the Jumpingpound area west of Calgary, Alberta. The discovery is due partly to several seismic surveys made in the course of exploration. The local geology has offered considerable difficulties in interpretation. - V. S.

085. Beles, A. A. Le tremblement de terre du 10 novembre 1940 et les bâtiments (The Earthquake of November 10, 1940, and the Buildings). Compt. rend. Acad. Sci. Roum., Bucharest, vol. 5, 1941, pp. 270-287.

The earthquake of November 10, 1940, which destroyed so much property, as called attention to the problem of constructing buildings in Rumania that ill be earthquake-proof. It was found that, among reinforced-concrete strucures and buildings having a steel framework, those designed and constructed n conformity with the official German specifications withstood the shock well, hereas a number of other buildings, especially very tall ones, were seriously amaged. The greatest disaster was the total collapse of the Carlton block in ucharest. The causes of this are sought, and various peculiarities in its esign are pointed out. Masonry houses have suffered, on the whole, more than id buildings of other construction. - I. Lehmann, Zentralbl. Geophys., eteorol., Geodäs., Berlin, vol. 10, No. 4, 1943, p. 187

oletin de Informaciones Petroleras. Y.P.F. inicia estudios de exploración en la provincia de Buenos Aires (Y.P.F. Initiates Exploratory Studies in the Province of Buenos Aires). Direccion General de Y.P.F., Buenos Aires, vol. 21, No. 241, 1944, p. 75. (see abs. 8055 in this issue).

086. Bonchkovskii, V. F. One of the methods of Determining the Velocity of Transverse Surface Waves for Plotting Dispersion Curves (in Russian). Bull. Acad. Sci. U.R.S.S. (Izvestiia), Moscow, Sér. Géogr. Géophys., No. 3, 1941, pp. 345-350.

The paper describes a graphic method for calculating the velocities of ropagation of seismic transverse surface waves. The application of this ethod to the study of seismograms of earthquakes has yielded dispersion urves showing the difference in the thickness of the earth's crust under lains and mountains. - Author's abs., translated by V. S.

087. California Oil World. Oil Exploration Begins in the Paraguay Chaco. Los Angeles, Calif., vol. 38, No. 1, 1945, pp. 7-9.

The Union Oil Co. of California has made an agreement with the Government of Paraguay for exploring the oil resources of a large tract in the haco territory. No wells have been drilled so far in Chaco, and no rock utcrops have been found. Thus, it will be necessary to depend entirely on eophysical methods for gathering subsurface information. The Western Geohysical Co., engaged by Union Oil, has sent out a seismograph crew to the ield. The plans of preliminary exploration and the conditions of work are riefly outlined. - V. S.

088. Critikos, N. A. Caratteristiche dei sismogrammi di terremoti prossimi ad Atene, Grecia, e fenomeni relativi nella regione epicentral (Characteristics of Seismograms of Earthquakes Close to Athens, Greece, and Related Phenomena in the Epicentral Region). Geofis. pura appl., Messina, vol. 4, 1942, pp. 82-96.

The author studied the question as to whether the first ground movement of an earthquake registers on the seismograms of a proximate station as a compression or a dilatation. The records accumulated since 1912 by the seismological station at Athens, Greece, served as material. The method consisted in first plotting the epicenters of earthquakes close to Athens on a map and then studying the distribution of compressions and dilatations with reference to epicentral positions. As a result, definite relationships were discovered; they are discussed. It is concluded that the first ground movement is registered at the Athens station as a push or a pull, according as the epicenter of the quake is located in a region sloping gradually upward or downward with reference to Athens. Cases of seismograms lacking P-waves were also investigated. They are explained by an abnormal depth of focus. - V. S.

8089. Dix, C. H. The Interpretation of Well Shot Data. Geophysics, Menasha, Wis., vol. 10, No. 2, 1945, pp. 160-170.

Five methods of shooting a well for the determination of vertical velocity, and the methods of reduction of the data, are discussed. Means are described for determining the existence of interference due to transmission of vibration down the cable which suspends the well geophone. - Author's abs.

8090. Gaby, P. P. A New Type of Seismic Cross-Section Wherein Accuracy of Representation Is Rendered Insensitive to Velocity Error. Geophysics, Menasha, Wis., vol. 10, No. 2, 1945, pp. 171-185.

A digest of this paper appeared in Oil and Gas Jour., Tulsa, Okla., vol. 42, No. 46, 1944, p. 105 (see Geophys. Abs. 117, No. 7406).

8091. Gamburtsev, G. A. Incomplete Systems of Hodographs of Refracted Waves (in Russian). Bull. Acad. Sci. U.R.S.S. (Izvestiia), Moscow, Sér. Géogr. Géophys., vol. 8, No. 2-3, 1944, pp. 72-86.

Some very simple "incomplete" systems of hodographs of refracted waves have a solution of the type: $U = U(v,q)$. Here "v" is an unknown parameter in the hodograph's equation which determines its multiple solubility. The other factor, "q," is a parameter the values of which can be assigned at will. Ofte it may be possible to determine the approximate value of v from physical or geological considerations. Then the largest and smallest values of U can be computed for each assigned q. The difference between the limits of U shows the error of interpretation and is a function of q. For many problems an optimal value of the parameter q brings the upper and lower limits of the variation of U closest together. In the present paper, q_{opt} is determined by a further condition: $U(\underline{v},q_{opt}) = U(\bar{v},q_{opt})$, where $(\underline{v},\bar{v})$ is the interval of the variation of v.

In the light of these considerations, two cases of incomplete systems of hodographs are considered: (1) Two-dimensional - deals with the interpretatio of a rectilinear hodograph of refracted waves in which there is no inverse tim curve and the real velocity in the lower medium is unknown; and (2) Three-dimensional - deals with the interpretation of a "traverse" hodograph in whic there is no complementary longitudinal time curve. The author shows that in ese cases the difference between the largest and the smallest values of pt may be so small that it is practically possible to regard the problems susceptible of a single solution. - V. S.

092. Gassmann, Fritz. Ein elektrischer Seismograph mit Fernregistrierung (An Electrical Seismograph with Registration at Distance). Verh. Schweiz. naturforsch. Ges., Geneva, 1941, pp. 100-101.

A new electrical seismograph is described for precise measurements of round vibrations. In its construction, particular attention is paid to the limination of friction, resonance-vibrations of parts of the apparatus, and xtraneous effects on pendular oscillations. The difficulties of astatizing vertical pendulum are overcome by combinations of supporting strings and evers. The apparatus has no lever-system for mechanical magnification. The scillations of the pendulum are transmitted to a sliding oscillograph by eans of a carrier-wave. - V. S.

093. Gutenberg, Beno. Amplitudes of P, PP, and S and Magnitude of Shallow Earthquakes. Bull. Seismol. Soc. America, Berkeley, Calif., vol. 35, No. 2, 1945, pp. 57-69.

It is found that the absorption coefficient for longitudinal and transerse waves in the mantle of the earth, as well as for longitudinal waves hrough the core, is 0.00012 per kilometer. In the average shallow earthuake about equal amounts of energy go into longitudinal and transverse waves. he equation developed in the text, together with two of the tables given herein, permits the calculation of the magnitude of a shallow earthquake rom the amplitudes of P, PP, or S. - Author's abs.

094. Gutenberg, Beno. Variations in Physical Properties Within the Earth's Crustal Layers. Am. Jour. Sci., New Haven, Conn., vol. 243-A (Daly volume), 1945, pp. 285-312.

In two recent papers the author has investigated with as high an accuracy s practicable travel times and average wave velocities in the crustal layers n southern California. However, it is not possible to use the observed time ata for conclusions as to the changes of the velocity within a given layer; he expected effects are of the same order of magnitude as the effects of ocal differences in structure (likewise investigated by the author). Zoepritz was the first to point out that changes with distance in the amplitudes f the observed waves may give information of this kind. The method outlined y him is employed in the present paper to study the changes in the velocity f elastic waves, the bulk modulus, and the coefficient of rigidity with depth ithin the layers of the earth's crust. The results are compared with data ound from laboratory experiments. The depth at which the melting point is eached is discussed. - Author's abs.

8095. Haarstick, F. von. Das Korrelationsverfahren in der Reflexionsseismik (The Correlation Method in Reflection Seismology). Oel und Kohle, Berlin, vol. 40, Nos. 13/14, 1944, pp. 197-202.

In reflection seismology, the correlation method is generally more satisfactory for underground exploration than the plotting of individual reflections because correlations can be studied on the seismograms themselves. This advantage is discussed in the example of a survey of a salt dome in Ostfreisland made in 1942 by means of a reflection apparatus. A primary condition of successful correlation, particularly with complex tectonics, is to distribute field measurements with a view to obtaining a coherent sequence. For this purpose, L. L. Nettleton's center-point control is sometimes used; its difficulties are indicated. In the survey under consideration, G. H. Westby's geophone arrangement obviating these difficulties was employed. The resulting seismograms are presented next to one another in the manner required for correlation; so ordered, they reveal the general pattern of geological configuration. This material is analyzed qualitatively and quantitatively. The findings are harmonized in a diagram of local tectonics. - V. S.

8096. Hodgson, E. A. Rockburst Research at Lake Shore Mines. Canadian Min. Met. Bull., Montreal, No. 397, 1945, pp. 267-269.

Rockburst predictions based on microseismims have been studied at the Lake Shore Mines, Canada, since May 1942. In 1943 favorable results were reported (Geophys. Abs. 120, No. 7851), but since that time research in another part of the mine has not been equally successful. A full year's observations have failed to predict the many bursts that occurred in the very block of ground serviced by the instruments. Thus, the microseismic method cannot as yet be relied upon to give dependable warnings of rockburst danger. However, extenuating circumstances have been discovered. Some bursts are caused by rock slips rather than by rock pressure; they result from comparatively smaller stress and may elude detection. Subaudible snaps can be heard at much greater distances than they can be properly recorded; they may fail to register. These and other observations, as well as the encouraging experiments of L. A. Obert (Geophys. Abs. 121, No. 7978), lead the author to conclude that studies of microseismims should be continued and new methods of application sought. - V. S.

8097. Horton, C. W. The Analysis of Oblique Reflection Data. Geophysics, Manasha, Wis., vol. 10, No. 2, 1945, pp. 186-206.

In regions where the reflecting layers have large dips it is difficult to interpret reflection data if the shot-point and the instrument-spread do not coincide. In this paper rigorous methods of locating the reflection-point and of determining the magnitude and direction of the dip are given. Two approximate solutions are discussed in detail, and by means of theoretical considerations and numerical examples it is shown that the errors introduced by the approximations are adequately small. - Author's abs.

98. Jones, W. M. Effects of Focal Depth on Epicentral Determinations from S-P Intervals in the South Pacific Region. New Zealand Jour. Sci. Tech., Wellington, vol. 26, No. 4B, 1945, pp. 219-226.

For earthquakes in the more important seismic portion of the South Pacif- , the effects of focal depth on the location of epicenters of S-P intervals Wellington, Brisbane, and Suva are investigated, and the displacements of icenters due to incorrect assumptions of focal depth are illustrated. thods are considered for obtaining directly good approximations to an epi- nter without any assumption of focal depth. - Author's abs.

99. Lees, G. M., and Taitt, A. H. "Anglo-Iranian" Oil Search in Great Britain Reviewed. Petrol. Times, London, vol. 49, No. 1,238, 1945, pp. 5-9, 31-33.

A review is given of a paper "Geological Results of the Search for Oil- elds in Great Britain", read by the authors to the Geological Society in ndon. The D'Arcy Exploration Co. started its British exploratory program 1936. Several wells were drilled, and geophysical surveying was done in ttinghamshire and Lincolnshire. A subsequent analysis of colliery data inted to an anticlinal axis at Eakring, Notts. This axis was confirmed by ismic reflection and refraction surveys. As a result, a well was drilled Eakring, and oil was struck on June 19, 1939. Further exploration was nfined, due to war, to the immediate vicinity. Oil accumulations were und at Kelham Hills, Duke's Woods, and Caunton. Eventually, sicsmic sur- ys were extended to the northeast, east, and south. The geological results various borings are described, and possible oil-bearing areas are tenta- vely indicated. Sketch maps illustrate the text. - V. S.

00. Lynch, W. A., and Dillon, Vincent. Characteristics of Alaskan Earthquake-Records at Distances of 40° to 70° (Abs.). Nat. Research Council, Am. Geophys. Union, Trans. 1944, pt. II, Washington, D. C., 1944, p. 282.

The records of Alaskan earthquakes are often confusing and difficult to terpret. The authors have studied some of these records with a view to de- cting definite trends that would reveal structure, paths, and travel-time. ve regions were considered: Aleutians, Alaskan Peninsula, Kenai Peninsula, diak Island, and East Alaska. Only records written at Fordham, at dis- nces of 40° to 70°, were used. The analysis was made in the light of the rk of Gutenberg, Adkins, Mukherjee, and Mangaswami, bearing on records at ch distances. The results are embodied in a table showing the phases early identified by the authors. Particularly worthy of note among them the late P and early S, the scarcity of reflected phases, and the late- ss of the surface waves. - V. S.

01. Macelwane, J. B. Progress Report of the Jesuit Seismological Association for the Years 1941, 1942, and 1943. Nat. Research Council, Am. Geophys. Union, Trans. 1944, pt. II, Washington, D.C., 1944, pp. 267-268.

During 1941-43 the stations of the Jesuit Seismological Association continued for the most part their regular work, in spite of the war. The Central Jesuit Station in St. Louis received cooperation from other seismologica stations throughout the world. In all, the Central Station made 74 locations of epicenters in 1941, 58 in 1942, and 45 in 1943. The great majority of them lie around the rim of the Pacific Ocean; a map is appended. In 3 years, the greatest focus depth of 300 km. was observed for one earthquake near the Fiji Islands, and for another in the Bolivian Andes. Nearly all the other major earthquakes on the West coast of South America, and many of them on the Pacific coast of Central America, were deeper than normal; in numerous cases, their depths reached 100 to 200 km. - V. S.

8102. Nature. The "Microtimer". London, vol. 153, No. 3889, 1944, p. 599.

The R. K. Dundas Co., Portsmouth, England, has produced an electronic timing device called the Microtimer. It measures the time interval between the making of two electrical contacts or between any other combination of contacts; it may also be operated without contracts. The standard instrument ha a range of 10 to 1,000 milliseconds. It functions from the customary D.C. lines, although there is a battery model. Tests show that the zero drift is negligible. The accuracy claimed is within ± 2 percent of the full range. The principle of the circuit is briefly described. The microtimer can have a large variety of applications. - V. S.

8103. Neumann, Frank, and McComb, H. E. A General-Purpose Vibration Meter. Nat. Research Council, Am. Geophys. Union, Trans. 1944, pt. II, Washington, D. C., 1944, pp. 313-315.

The United States Coast and Geodetic Survey has undertaken to construct new vibration meters. They are required in studies of ground vibration, vibration of engineering structures, local shocks, preliminary waves of distant quakes, and microseisms. The instrument is of the Neumann-Labarre type and embodies many new improvements. In essence, the apparatus consists of a short boom supported by hinges and carrying a heavy mass. This mass may be adjusted to any position along the boom in order to secure the pendulum length desired. The outer end of the boom terminates in a three-pronged fork, so arranged that the thread operating the spindle may be controlled. The spindle carries a planoconvex mirror for use in optical registration. A right-angle prism mounted directly in front of this mirror directs the reflected light to the boom. Some further details are described. The instrument is shown in photographs. - V. S.

Noya, R. M. The Application of Geophysics to Water Supply Problems. Mine & Quarry Eng., Maidenhead, Berks., vol. 10, 1945, No. 1, pp. 15-19; No. 2, pp. 40-45. (See abs. 8116 in this issue.)

8104. Pendse. C. G. On the Theory of Seismometers. Phil. Mag., London, vol 35, 1944, pp. 706-713.

The exact general equation of motion of a seismometer is obtained, an im-
rtant particular case being: $\ddot{\psi} + 2A\dot{\psi} + (n^2 + H \sin pt)\psi = BA_y \sin pt$.
e particular integral and complementary function of this equation are found,
d the equation is solved as far as the first order of the acceleration terms.
e results obtained are discussed in relation to seismometers and seismograms,
d it is shown that resonance periods other than the free period of the instru-
nt may exist. An alternative form for the ground motion is considered. -
S.F., Phys. Abs., London, vol. 48, No. 566, 1945.

05. Petrescu, G. Détermination de l'épicentre du tremblement de terre do Roumanie du 22 octobre 1940 (Determination of the Epicenter of the Earthquake of October 22, 1940, in Rumania). Bull. Sect. Sci. Acad. Roum., Bucharest, vol. 24, 1942, pp. 517-528.

The epicenter of the earthquake of October 22, 1940, in Rumania was cal-
lated by the following method: (1) Several pairs of stations with similar
rival times of P waves were selected. For each pair, the approximate posi-
on of the epicenter was determined on the basis of the average plumb-line
ading between the stations of the pair. (2) The travel time from the focus
s calculated by a compensation technique on the basis of the arrival times
P and S waves at stations removed from the focus by not more than 24°. With
e aid of this travel time, compensations were introduced into distances from
e focus for improving their precision. The resulting distances served for
mputing corrections for the coordinates of the epicenter. (3) Finally, four
tations removed from the focus by not more than 7° were used for the deter-
ination of the depth of the focus. This depth was found to be 122 km. (4)
r a check, the results were compared with macroseismic results on the
rthquake. - V. S.

06. Ricker, Norman. The Computation of Output Disturbances from Amplifiers for True Wavelet Inputs. Geophysics, Menasha, Wis., vol. 10, No. 2, 1945, pp. 207-220.

A procedure for the computation of amplifier output forms for a true wave-
t input form is outlined, and examples are given showing the manner in which
ese output forms may be determined from the known amplitude vs. frequency
d phase vs. frequency characteristics curves of the amplifiers. - Author's
s.

07. Robertson, Florence. A Mathematical Analysis of Numerical Integration of Electromagnetic Seismograms. Nat. Research Council, Am. Geophys. Union, Trans. 1944, pt. II, Washington, D. C., 1944, pp. 294-304.

The author has previously applied numerical integration to the third in-
gral in Galitzin's expression of earth motion. The curves obtained proved
be unreliable. Accordingly, the process of numerical integration is now
bjected to critical examination. (1) Several simplifying assumptions are
de. The mathematical equations of all three integrals are deduced. For

each equation, a comparison is made between the curves of the analytical integral and of the numerical integral plotted for different time increments. The curves are presented. (2) Certain differences are found between the true integral and the numerical integral, such as a phase difference, a translation of the axes, etc., which are incompatible with a use in Galitzin's equation. The causes are studied in the light of the conditions of harmonic motion. (3) It is further discovered that the third integral is differently dependent on phase correction and on the first constant of integration than are the first and second integrals. In the light of these considerations, the unreliability of the former results are attributed to the choice of too large a time increment, and to the approximate character of all integration. Difficulties are inevitable because numerical integration is inherently an approximation process and errors are cumulative. - V. S.

8108. Ulrich, F. P. A Cooperative Sismological Program with South and Central America. Nat. Research Council, Am. Geophys. Union, Trans. 1944, pt. II, Washington, D. C., 1944, pp. 271-274.

The author went to South and Central America to develop a cooperative seismological program for the total Western Hemisphere. He reports his observations on the local work and discusses a plan of cooperation. The plan resembles that carried out in the western United States by the United States Seismological Field Survey. The observations include the following: (1) Reports of current earthquakes through questionnaires exist only in Chile and Ecuador. (2) Detailed descriptions of major shocks are made in Chile, Ecuador El Salvador, and Peru; some good descriptions were found in Colombia and Venezuela. (3) Fault maps are prepared for limited areas in Costa Rica, Ecuador, Panama, and Peru. (4) Building codes for reducing loss of life and damage to property have been enacted in Chile, El Salvador, Costa Rica, Ecuador, Guatemala, and Panama. (5) Accelerographs and seismographs operate at some stations in sufficient numbers; desirable locations for new installations are indicated. In conclusion, measures are recommended for putting the hemispheric program into effect; they include, in the first place, the establishment of a seismological bureau. - V. S.

8109. Voitești, I. P. Considérations géologiques sur la région épicentrale du tremblement de terre de Roumanie, du 10 novembre 1940 (Geological Considerations Regarding the Epicentral Region of the Earthquake of November 10, 1940, in Rumania). Compt. rend. Acad. Sci. Roum., Bucharest vol. 5, 1941, pp. 179-203.

The Rumanian earthquake of November 10, 1940, is described with regard to the geological characteristics of the epicentral region, the causes of the quake, effects on adjacent areas, focus-depth determination, the propagation of macroseismic waves, and the influence of fracture lines on the direction of propagation. Rumanian earthquakes are then discussed in the light of the entire European seismic structure. - V. S.

10. Walter, E. J. An Extension of the Method of Numerical Integration of Seismograms to Include a Third Integration (abs.). Nat. Research Council, Am. Geophys. Union, Trans. 1944, pt. II, Washington, D. C., 1944, p. 289.

The integration of a galvanometrically recorded seismogram is discussed th a view to obtaining a record of actual ground motion. For such purpose, e integration process must be carried out over three integrations. There- re, the solution demands that the theory of double integration, as devel- ed by Neumann and others, be extended to include a third integration. The sential problem here is to determine the nature of the cumulative error and find a method of correcting this error. Such a method is developed by the thor and applied to a seismogram produced by a known motion. The following sults are obtained: (1) The error curve is a cubical parabola; (2) the ror is a function of each particular ordinate; (3) the correction factors ould be determined for small intervals; and (4) the results are limited to e range beyond which the transient effects due to seismometer and galvano- ter are effective (unless they are eliminated). - V. S.

11. Wood, H. O. A Note on the Charleston Earthquake. Bull. Seismol. Soc. America, Berkeley, Calif., vol. 35, No. 2, 1945, pp. 49-56.

Data of observation presented in Dutton's report upon the Charleston rthquake are tested with formulas extracted from the paper by Gutenberg and chter on "Earthquake Magnitude, Energy, Intensity, and Acceleration," with e resulting suggestions that the depth of focus may have been near 40 kilo- ters (25 miles) and the shock magnitude a little less than 8 on the Richter ale. Definite conclusions cannot be reached with the inadequate data now ailable, but this would explain the large area of perceptibility of the arleston shock as compared, for examples, with those of earthquakes in lifornia. - Author's abs.

4. ELECTRICAL METHODS

12. Börner, R. Das Geoskopverfahren nach Dr. Machts und Mitarbeitern; 6 Jahre Geoskop-Forschung (The Geoscope Method According to Dr. Machts and his Collaborators; 6 years of Geoscope Investigation). Geiseen, Münchowsche Universitäts-Druckerei, 1944.

A detailed account is presented of numerous geoscope surveys and their sults. The introduction outlines the development of the method and its paratus. Part I gives a general description of geoscope surveying. Part deals with specific geoscopic surveys. Lastly, part III is devoted to a udy of secondary physical influences. In the text, empirical results are esented together with theoretical problems. Certain conflicts are dis- vered between the data of geoscope measurements and the physical theory of ectromagnetic waves, and explanations are suggested. Attention is devoted locating tectonis disturbances at depth. Though geoscope instruments can- t serve for depth determinations, they are quite sensitive to disturbances a few meters in thickness buried under a cover of several hundred meters. Th limit of the method in this respect has not yet been determined. - V. S.

8113. Evjen, H. M. The Principle of Variation in Path with an Application to Structural Mapping. Geophysics, Menasha, Wis., vol. 10, No. 2, 1945, pp. 221-228.

A general functional analysis of the low frequency electric exploration problem is presented. The theory is applied to some field data where a fair degree of subsurface control exists. - Author's abs.

8114. Fritsch, Volker. Neuere Messgeräte für die Funkmutung (New Measuring Instruments for Radioprospecting). Elektr. im Bergbau, Munich, vol. 17, 1942, pp. 41-49.

Radioprospecting (Funkmutung) is carried out by means of electrical methods employing high frequencies. Suitable for such use are the methods of resistivity, substitute capacity, and subsoil and suprasoil spreading (includ ing geoscope and ellipsoid methods). They are described with respect to unde lying principles and the latest apparatus. The sources of error are indicate for each method. - V. S.

8115. Lundberg, Hans. Tracing the Course of a Flat-Angle Diamond Drill Hole by Electric Equipotential Lines (abs.). Economic Geology, Lancaster, Pa., vol. 40, No. 1, 1945, p. 90.

The hole, drilled at a flat angle, had wandered off its intended course. Surveys using a small compass did not give a true picture on account of strong magnetic anomalies in the vicinity of the hole. An equipotential survey of the area revealed the course of the hole fairly definitely. Later drilling has amply demonstrated the accuracy of the electrical survey. - Author's abs.

8116. Noya, R. M. The Application of Geophysics to Water Supply Problems. Mine and Quarry Eng., Maidenhead, Berks., vol. 10, 1945, No. 1, pp. 15-19; No. 2, pp. 40-45.

Electrical and seismic methods are discussed in application to water-supply exploration. (1) Electrical surveying is reviewed historically. Then attention is devoted to the vertical methods of electrical sounding based on Wenner's fall of potential principle and to the horizontal methods of resistivity mapping, using Schlumberger's curves of equal resistivity. Water measurements inside wells are considered. Some requirements as regards electrical apparatus are indicated. It is pointed out that the resistivity of formations varies according to the electrolytic conductivity of water, porosity of rock, percentage of voids filled with water, and area of contact between water and rock. Therefore, a direct localization of water by electrica kploration is not usually possible, and much assistance from geology is nec- ssary. (2) Seismic surveying is likewise reviewed historically. The general rinciples are indicated, and the reflection and refraction methods described. eflection surveying serves mostly for investigations at depths of 1,000 eters or more, and it is seldom employed for water exploration. Refraction urveying is better suited for water search, and it can be varied by the dis- osition of the receiving elements in the ground for vertical or horizontal rospecting. The apparatus are briefly considered. The speed of seismic aves in the subsoil depends fundamentally upon the modulus of elasticity, oisson's ratio, and density of rock material. Since the presence of water n a formation lowers the speed of propagation in a compact formation and in- reases it in a muddy or loose formation, geological knowledge is again essen- al for accurate interpretation. The paper is illustrated by numerous rawings. - V. S.

117. Oil and Gas Journal. Patents Issued on New Electrical Method for Oil Prospecting. Tulsa, Okla., vol. 43, No. 41, 1945, p. 79.

H. C. Hayes, United States Naval Research Laboratory, recently was ranted two patents on a new method of electrical prospecting for oil (see os. 8171 and 8172 in this issue). This method detects the geological for- ations favorable to oil accumulation. It is based on the following field bservations: (1) Whenever an oil-bearing formation is surveyed electrical- y and the vertical current stream takes the form of sheets arising along ts boundary, the axis of these sheets indicates the boundaries of the for- ation; and (2) when electrical surveying comprises a series of readings ade of the potential drops between an electrode at one end of the cable and ther electrodes at the stations, the potential's profile curve reveals the ritical features characterizing the presence or absence of oil-bearing for- ations. The patents may be used by, or for, the United States Government ithout payment of royalties. - V. S.

118. Ruedy, R. The Use of Cumulative Resistance in Earth-Resistivity Surveys. Canadian Jour. Research, Ottawa, vol. 23A, No. 4, 1945, pp. 57-72.

When the soil is assumed to consist of two layers - the upper of resis- ivity p_1 and the lower of resistivity p_2 - and cumulative resistances are alculated by adding or integrating the earth-resistivity functions for in- ervals that are a fraction of the thickness of the upper layer, a practi- ally linear relation is obtained between the cumulative resistance and the lectrode spacing until the distance between the electrodes is equal to the ickness of the upper material. Should one of the materials be at least wice as conducting as the other, the extent of the deviation from the linear aw enables the determination of the depth of the upper stratum and of the atio between the resistivities of the two layers. When three layers are resent and the middle layer is at least twice as thick as the top stratum, e thicknesses may be deduced from the two departures of the cumulative re- istances from the linear law. Since these conclusions are based on the theory of the individual apparent resistivity of stratified ground at various electrode spacings, they have the same range of application as the earth-resistivity curves, but the occurrence of straight line graphs facilitates the plotting and the interpretation of results based on a necessarily limited number of measurements. - Author's abs.

8119. Wichmann, H. Sign and Field Strength of Field Changes Due to Lightning. Gerlands Beitr. Geophys., Leopzig, vol. 59, No. 1, 1942, pp. 32-4

Field changes caused by lightning discharges are registered by 3 methods of widely differing rates of response. 1,300 records are analyzed with respect to the signs of the field changes and their variations with distance. Indications are purported to have been found, according to which Wilson's values of field changes are too small by a factor between 10 and 100. - R.H.G., Sci. Abs., vol. 47, No. 560, 1944.

8120. Zaborovskii, A. I. Electrical Exploration (in Russian). Gosudarstvennoe Nauchno-Tekhnicheskoe Isdatel'stvo Neftianoi i Gorno-Toplivnoi Literatury, Moscow, 1943, 444 pp.

This comprehensive textbook covers the theoretical foundations and practical methods of electrical prospecting. (1) Under the heading "Direct rent" are treated such methods as resistivity, natural electric currents, charged body, and electrical coring, as well as the topics of the D. C. field in a heterogeneous and anisotropic field, the magnetic field, etc. (2) Under alternating currents of low and high frequency are discussed the methods using loops, equipotential lines, intensity, relationship between potentials, phases, two frames, infinite conductor, induction, and the wave methods, as well as the subjects of the electromagnetic field in the earth, its harmonic variation, its equations, the dipole, and the flat conductor. The book is approved for use in the higher educational institutions of the oil industry. - V. S.

5. RADIOACTIVE METHODS

8121. Gish, O. H. A Curious Effect in an Ionization Meter. Terrestrial Magnetism and Atmospheric Electricity, Baltimore, Md., vol. 50, No. 2, 1945, pp. 135-137.

Measurements show that the capacitance of ionization meters varies considerably from one instrument to another. K. L. Sherman has tested C. I. W. ionization meters and found that their rate of ion formation per cubic centimeter was more than three times that measured with a Kolhörster penetrating-radiation meter made in 1928. Kolhörster, and Hess and Reitz, tested six similarly constructed instruments using several different methods, and also found discrepancies, though less-pronounced. The author explains this variation in part by a secondary radiation from the walls which changes with time. This "Wall effect" is in some cases considerably greater than the well-known transition effect". Evidence by V. F. Hess is cited, revealing a wall ef- ect of this type and showing that it is very sensitive to the condition of he wall. Other data are considered. It is concluded that careful attention ust be accorded to the "wall effect" if serious errors in ionization measure- ents are to be avoided. - V. S.

122. McCusker, C. B. A. A New Type of Counter for Ionizing Particles. Jour. Sci. Instruments, London, vol. 21, No. 7, 1944, pp. 120-122.

Geiger-Müller counters suffer from two disadvantages: (a) The thickness f the walls limits the radiation which may be studied to that above a cer- ain minimum energy, and (b) their shape and the thickness of the walls pre- ents complete cover being obtained in anticoincidence work. A new type of ounter is described in which these difficulties are overcome. Preliminary ests give a minimum value of 89 percent for the efficiency, and absorption xperiments show that 85 percent of the particles counted have an energy less han 1.5 x 10^6eV. - Author's abs.

123. Mercier, V. J. Radioactivity Well Logging in Kansas. Tomorrow's Tools - Today, Los Angeles, Calif., vol. 11, No. 1, 1945, pp. 4-9. Abridged in Oil and Gas Jour., Tulsa, Okla., vol. 43, No. 52, 1945, pp. 90-94.

The applications and advantages of gamma-ray and neutron logs in Kansas il fields are described; the underlying principles are briefly indicated. 1) The most-important advantage of radioactivity logs is their ability to ocate oil-bearing strata through the casing and cement. As an example, the ogs of the Silica field, Barton County, are discussed. (2) Next in impor- ance is the ability to record through any type of borehole drilling fluid. adioactivity logs are not affected by the electrical conductivity of salt- ater mud, oil-base muds, or other drilling fluids, which handicap the elec- rical log. The relative costs of radioactivity and electrical logging are abulated. (3) A further advantage is the ease and accuracy of correlation sed in exploration and work-over operations. The Adell Pool, Sheridan Coun- y, logged by the Continental Oil Co. is discussed as an example. (4) The eutron logs respond to entering or leaving fluid or casing. This feature is eing increasingly exploited in Kansas. Its application is illustrated by he example of Arbuckle Dolomite fields. Some other advantages of radioacti- ity logs are listed. The text is illustrated by samples of logs and bibli- graphical references are given. - V. S.

124. Muchemblé, G. Sur la radioactivité élevée des roches marines du tertain houiller du Nord de la France (Concerning the High Radioactivity of the Sea Rocks of the Coal Strata in the North of France). Compt. rend. Acad. Sci., Paris, vol. 216, 1943, pp. 270-271.

Ampelites (carbonaceous shales) rich in organic matter contain much more adium (up to 10.5 x 10^{-12} gram per gram of rock) than the limestones and igneous rocks of the same district. - L. J. S., Mineralog. Mag., London, vol. 27, No. 187, 1944, p. 71.

8125. Nawijn, A. The Mechanism of the Geiger-Müller Counter. Physica, Hague; pt. 1, vol. 9, No. 5, 1942, pp. 481-493; pt. 2 (with J. De Jong) vol. 10, No. 7, 1943, pp. 515-530; pt. 3 (with D. Mulder), vol. 10, No. 7, 1943, pp. 531-545.

Part 1. In this paper we compare our experiments on Geiger-Müller counters with the theories on the instability of the discharge "corona" - the phenomenon on which is based the functioning of the counters. It is found that the old theories (Hippel, Werner, and others) are insufficient even for giving a qualitative explanation of the observed phenomena. The theory of the hiatus (van Geel and Kerkum, Schade, Nunn-May) can give such an explanation, but the numerical agreement between the theory and the experiments is far from perfect. Accordingly, the latter theory has been modified by us with a view to improving the agreement. In presenting this work, we now begin with an introductory part which briefly describes the manner of using the instability of the discharge corona and the conditions necessary for obtaining a counter with a high resolving power. Further, the time periods characteristic of the impulses are evaluated, and their influence upon the resolving power is discussed. Our theory can also explain the functioning of the counters operated by alcoholic vapor.

Part 2. In this paper, counters operated by alcoholic vapors are examined more closely. We have particularly studied the phenomenon of posterior discharges often manifested in them. We also demonstrated that the phenomena observed in counters with alcoholic vapors can frequently be described similarly to those in counters with hydrogen. On the other hand, we have studied theoretically and experimentally the time periods characterizing impulses in the counters filled with gas or vapor. The influence of these mediums on the resolving power of counters is discussed.

Part 3. In this paper, we have deduced a generalized expression for the duration of a discharge in the Geiger-Muller counter. It is possible to understand by means of our method why the counters filled with certain gases give excellent results, why the employment of other gases yields mediocre results, and why with some gases the counters cease to function. We have studied theoretically and experimentally the minimum current (the current necessary for producing discharges of an average duration of 1 second) in its dependence upon the pressure of the gas and the dimensions of the counter. The interest of these investigations lies in the fact that a high minimum current makes it possible to obtain a large resolving power. - Authors' abs., translated by V. S.

8126. Shchepot'eva, E. S. The Radioactivity of the Waters and Rocks of Zheleznovodsk (in Russian). Bull. Acad. Sci. U.R.S.S. (Izvestiia), Moscow, Sér. Géorgr. Géophys., vol. 8, No. 6, 1944, pp. 406-411.

Measurements were made at different times, since 1916, of the radioactivity of the waters and rocks in the town of Zheleznovodsk, a Caucasian spa.

e local geology is described, the results of the surveys of 1927-40 are bulated, and conclusions are given. The latter are in part as follows:) The greatest radioactivity is found in trachyliparites, and it is higher an usually observed in eruptive rocks; the radioactivity of sedimentary cks does not exceed ordinary values. (2) The radioactivity of some spa-diments and of travertines is also considerable. (3) The Ra content in the ters of most spas is higher than usual. (4) The emanation coefficients of achyliparites are relatively small; they range from 2.5 to 21.0 percent. - S.

27. Technical News Bulletin of the National Bureau of Standards. Thin-Walled Aluminum Geiger-Müller Counters. U. S. Dept. Commerce, Washington, D. C., No. 340, 1945, p. 62.

Geiger-Müller tube counters, consisting of an insulated wire mounted ially in a metal tube that is maintained at a potential several hundred lts from that of the wire, are useful in the measurements of beta radia-on from radioactive substances. The tube counter is sensitive to very low tensities of beta radiation, as it records each beta particle that passes rough it by producing an electric pulse that can be amplified and registered. e application of Geiger-Müller tube counters to the measurement of beta rays restricted by the fact that beta rays with energies as high as 1,000,000 lts can penetrate only a fraction of an inch of ordinary materials. This ans that the counter tubes must have walls that are very thin and of low nsity. Most previous attempts to achieve this have been laborious and ex-nsive, as the tube counter must be gastight. By using methods to plate in layers of copper on commercially available aluminum tubes, such as are ed for toothpaste, Burrell W. Brown and L. F. Curtiss have found it poss-le to make very excellent thin-walled counters by soldering a metal plug in e open end of the aluminum tube. As described in the Journal of Research r August (RP1666), these plugs support the insulators and glass tube for lling and sealing. The walls are only 0.004 inch in thickness, which per-ts most beta rays to pass through and be recorded. Counters made in this y are relatively inexpensive. - Anon.

28. Wickman, F. E. Can the "Lead Method" be Used on Igneous Rocks? Arkiv Kemi, Min. Geol., Stockholm, vol. 16A, No. 23, 1943, 9 pp.

From the amounts of the isotopes Pb^{204}, Pb^{206}, Pb^{207}, and Pb^{208} found in igneous rock, formulae are given for calculating their relative abundance the time of crystallization, and hence the age of the rock. - L. J. S., neralog. Mag., London, vol. 27, No. 187, 1944, p. 69.

6. GEOTHERMAL METHODS

29. Korytnikova, N. N. Regarding the Relation of Subsurface Tempetures to the Thermal Coefficients of Rocks and to the Shape of Subsurface Structures (in Russian). Bull. Acad. Sci. U.R.S.S. (Izvestiia), Moscow, Sér. Géogr. Géophys., No. 3, 1943, pp. 115-133.

A mathematical study is made of thermal anomalies caused in the earth's crust by subsurface bodies of different thermal conductivity. (1) First, thermal distribution is analyzed for the case of plane strata extending infinitely in all directions. Both horizontal and inclined strata are considered; mathematical formulas are given. It is found that the inverse ratio of geothermal gradients to coefficients of thermal conductivity holds only for horizontal layers. (2) Next, various cases of strata finite in extent and delimited by surfaces of different forms are examined. The mathematical formulas for thermal distribution and the graphs of isotherms are presented. (3) Finally, the preceeding discussions are applied to evaluating the existing methods for calculating thermal gradients and heat flow. It is found that the determination of gradients from the earth's surface down to a given point by the formula $\gamma = u - u_0/\Delta z$ should be abandoned. It does not give either the real gradient at the point, or its average value for the entire region. A better method is that of least squares; it may serve for calculating the average gradient for the whole region of a borehole. - V. S.

8130. Kraskovsky, S. A. Geothermal Measurements in Artesian Boreholes (in Russian). Akademiia Nauk S.S.S.R., Trudy Komissii po Geotermike, Moscow, Vypusk I, 1941, pp. 16-30.

In the U. S. S. R. the largest number of geothermal measurements has been made in artesian boreholes. Since these boreholes are scattered over a very wide area, the findings give an approximate idea of the general distribution of geothermal gradients in the country. The author reviews 47 surveys made from 1870 to about 1932. The depth of geothermal measurements ranges from 40.5 to 795.0 meters. The results show a variation of temperatures from 5.0° to 52.5° C. and a variation of geothermal gradients from 1.4 (Caucasus) to 45.6 (Moscow), in m/C°. The districts of Moscow, Kharkov, and Leningrad have the largest number of artesian boreholes. The latest work here with use of up-to-date instruments and methods was done about 1932. In Kharkov the average geothermal gradient was 37.7 $m./C.^{\circ}$; in Leningrad gradients ranged from 27.0 to 45.0 $m./C.^{\circ}$. The paper is illustrated by curves of thermal distribution through different depths. - V. S.

8131. Romanovsky, Vsevolod. Sur un appareil permettant la détermination de la conductibilité thermique des sols (Concerning an Apparatus for the Determination of the Thermal Conductivity of Soils). Compt. rend. Acad. Sci., Paris, vol. 213, 1941, pp. 584-586.

A description is given of a method and an apparatus for determining the thermal conductivity of soil samples. On the basis of observations on Spitzbergen samples, the view is advanced that conductivity depends not only on soil particles but also, in part, on ions contained in the soil. - V. S.

7. GEOCHEMICAL METHODS

132. Tripp, R. M. Thermodynamics of a Gas Migrating Vertically Through the Sedimentary Column. Geophysics, Menasha, Wis., vol. 10, No. 2, 1945, pp. 229-237.

The gaseous hydrocarbons in a petroleum trap which escape to the surface diffusing through the semipermeable geologic column are viewed thermodynam- ally to see if there might be an energy transfer involved that could produce significant shift in the chemical, physical, or biologic equilibrium of the ocal environment. - Author's abs.

133. Tripp, R. M. Measurement of Soil-Air Ions Over the Fort Collins Anticline. Geophysics, Menasha, Wis., vol. 10, No. 2, 1945, pp. 238-247.

The soil solution is examined for compounds of very low solubility prod- cts which might exist in a state of saturation over a large area; some radio- ctive compounds are found to fill this requirement better than any others. t is postulated that these minerals are preferentially precipitated in the nterstices of the near surface soil by the evaporation of the soil water aused by the passage of gaseous hydrocarbons escaping from their subsurface eservoir. Measurements of the rate of formation of ions in the soil air ver a producing structure are presented. - Author's abs.

134. van Tuyl, F. M., and others. Geochemistry and Geobiology. Colorado Sch. Mines Quart., Golden, Colo., vol. 40, No. 2, 1945, pp. 79-81, 112.

The developments in geochemistry and geobiology during 1944 are outlined n the basis of the publications and patents that appeared during this year. he scarcity of reports on fundamental research, the tentative character of echniques, and the prominence of theoretical considerations are noted. A ibliography is appended. - V. S.

8. UNCLASSIFIED METHODS AND TOPICS RELATED TO GEOPHYSICS

135. Borchers, R., and White, G. V. Geology of the Odendaalsrust Gold Field. Mining Jour., London, vol. 224, No. 5723, 1945, pp. 260-263.

A gold field has been discovered southeast of Odendaalsrust, N.W. Orange ree State. Exploration was carried out in part by geophysical methods. (1) agnetic surveys were begun in 1938. Later the African & European Investment o. made a survey of several thousand magnetic stations. The results were nconclusive, and the work was abandoned. (2) Gravimetric surveys were made bout the same time. A preliminary survey by the African Geophysical Explora- ion Co. indicated a zone of relatively low values which became productive. urther exploration included a torsion-balance survey of 1,240 stations and confirmatory gravimeter grid of 58 stations; Oscar Weiss introduced the dea of exploiting the density difference between the Ventersdorp lavas and the underlying quartzites. There were also specific-gravity determinations of rock specimens. Generally, drilling has borne out the gravimetric predictions. (3) Temperature determinations were made in a borehole in 1939-41. They established the following geothermic steps: Karroo beds, 65 ft. per 1°F.; lava and agglomerate-conglomerate, 140 ft. per 1°F. (mean); and underlying quartzites, 225 ft. per 1°F. The temperatures at 5,000 ft. in this area would seem to be comparable with the temperatures at about 8,500 ft. on the Witwatersrand. - V. S.

8136. Bulletin of the American Association of Petroleum Geologists. Review of Exploration and Development in 1944. Tulsa, Okla, vol. 29, No. 6, 1945, pp. 629-856.

Under the general title "Review of Exploration and Development in 1944" are presented 17 articles by different authors covering oil activities in the United States as a whole, its principal petroliferous regions, and Canada. Most articles contain brief references to geophysical work. - V. S.

8137. Cram, I. H. Resources and Resourcefulness. Bull. Am. Assoc. Petrol. Geol., Tulsa, Okla., vol. 29, No. 7, 1945, pp. 857-864.

In this presidential address to the American Association of Petroleum Geologists 30th annual meeting the author pointed out that natural oil and gas resources can be put to use only through resourceful exploration. Referring particularly to the information acquired by geophysical surveying, he said: "Geologists can add materially to the interpretations made largely by non-geologists by taking the trouble to learn the principles of the various geophysical methods, and, more important, by working with the data and realizing that they are, in fact, geologic data." - V. S.

8138. Deegan, C. J. Vigorous Exploratory Play Focuses Attention on Rocky Mountain Area. Oil and Gas Jour., Tulsa, Okla, vol. 43, No. 43, 1945, pp. 41-42, 47.

The Rocky Mountain region of the United States is currently undergoing much exploration. Geophysics is being used on a constantly expanding scale. The number of geophysical crews increased from 15 in 1941 to 22 in 1942, to 34 in 1943, and to about 70 in 1944. The general procedure involves reconnaissance with gravimeter, followed by detailing with seismograph. Much activity has been centered in the Big Horn Basin, the Wind River-Shirley Basin, the Green River Basin, the Washakie Basin, the Uinta Basin, and the Powder River Basin; all of these, except Powder River, lie in the western part of Wyoming and the northwestern part of Colorado. The structural features of the Rocky Mountain region are discussed and illustrated by sketch maps. - V. S.

39. Dresbach, C. H. Organization of Geophysical Parties for Foreign Exploration. Geophysics, Menasha, Wis., vol. 10, No. 2, 1945, pp. 137-159.

Current and future requirements of petroleum have produced a strong de- nd for American personnel, equipment, and techniques to be employed in the rld-wide search for oil. Different, and sometimes much more difficult, nditions are frequently encountered from those customarily met in the ex- oration for oil in the United States. A brief consideration of some of ese factors is the purpose of this paper. It is concluded that while care- l preliminary planning and the design of equipment in the light of accurate formation on conditions to be encountered are highly vital factors, the monstrated and trustworthy character of the personnel conducting the opera- ons is the biggest guarantee of success in the undertaking. - Author's abs.

40. Fritsch, Volker. Die Erforschung des Wünschelrutenphänomens (Investigation of the Divining-Rod Phenomenon). Umschau, Frankfort a M., vol. 46, 1942, pp. 357-361.

No satisfactory explanation has been found so far for the divining-rod actice. To clarify this phenomenon, the author made some tentative experi- nts. He discusses the problem, communicates some results, and outlines the nditions of scientific investigation. Actually, in the use of the divining d the subsurface conditions influence the man bearing the rod, rather than e rod itself. Moreover, the indications from the subsurface are not phy- ological or phychological, but physical. Unfortunately, all these factors e difficult to separate. Any successful study must control the variables, ve reproducible results, and achieve an impartial interpretation. - V. S.

41. Gabriel, V. G. Mathematical Chance of Finding Oil. Oil Weekly, Houston, Tex., vol. 117, No. 12, 1945, pp. 49-50, 56.

In oil exploration, the investment of funds, the choice of methods, and her problems are usually solved on the basis of wholly uncertain estimates the chances of success. The author shows that an application of the mathe- tical theory of probability would render these estimates more definite and ecise. The essentials of the theory are explained. Then the statistics of oductive and dry wildcats in the United States during 1939-43 are used for mputing the over-all probability which a producer has of discovering a pro- ctive well. It is found that, for the United States as a whole, the proba- lity during the said period was 1 in 6.1, if drilling was based on geologi- l information only; 1 in 5.0, if it was based on geophysical information ly; 1 in 4.4, if based on both geological and geophysical information; and in 20.6, if based on nontechnical information. Similar computations for xas alone give somewhat higher probabilities. The Texas figures are fur- er used for computing the probable profit to the producer; standard assump- ons are made on the worth of oil discoveries and the cost of leasing, ex- oring, and drilling. It is found that employing both geophysical and geo- gical information for drilling would result in a gain of $657,000, whereas ing nontechnical information would result in a gain of only $16,000. - V.S.

8142. Gunter, Herman. Florida Geology and Petroleum. Oil, New Orleans, La., vol. 4, No. 11, 1945, pp. 11-12, 16; Interstate Oil Compact Quart. Bull., Oklahoma City, Okla., vol. 3, No. 4, 1944, pp. 23-28.

Considerable geophysical work has been done in Florida in 1944. It included seismograph, magnetometer, and gravimeter surveys. (1) Siesmic reflection exploration was handicapped by an absence of marked lithological discontinuities in the local stratigraphy, particularly in the deeper zones. Recent refraction work seems to have been more successful. (2) Magnetometer and gravimeter results were difficult to interpret because little drilling has been done in Florida, and the knowledge of the subsurface is very limited. - V. S.

8143. Hallenbach, F. Die Durchlässigkeit poröser Gesteine und ihre Bestimmung (The Permeability of Porous Rocks and Its Determination). Oel und Kohle, Berling, vol. 39, 1943, pp. 7-20.

A distinction is made between the porosity and permeability of rocks. Both have significance as regards oil and gas reservoirs. Permeability, however, is more important because it indicates the productive capacity of deposits. The notion of permeability is discussed in the light of Darcy's law for liquids and gases. The methods of measuring permeability in the laboratory and in the field are described and clarified by examples. - V. S.

8144. Heroy, W. B. America's Future in Oil. Mining Mag., London, vol. 72, No. 5, 1945, pp. 308-311.

The author gave a presidential address before the Society of Economic Geologists and the American Institute of Mining and Metallurgical Engineers in February 1945. Therein he presented an economic and technical account of the oil situation in America. The contributions of geophysical exploration were considered. The view was expressed that the future will bring no material change in the type of oil accumulations discovered. By far the larger part of the newly found oil will continue to occur in traps that can be detected by exploring for structures. Geophysical methods have achieved a marked success in such prospecting. - V. S.

8145. Illing, V. C. Role of Stratigraphy in Oil Discovery. Bull. Am. Assoc. Petrol. Geol., Tulsa, Okla., vol. 29, No. 7, 1945, pp. 872-884.

In oil search, both geologists and geophysicists are now primarily concerned with structural traps. Yet, every structural feature is a part of a stratigraphic history and poses stratigraphic problems. Hence, stratigraphic requirements must be fulfilled before structural criteria can be applied. Taking this viewpoint, the writer discusses stratigraphic processes in relation to source rocks, reservoir rocks, and oil preservation. He points out that in the large basins of prolonged deposition, the preservation of oil and gas meets no difficulties, particularly when these are young; however, older sedimentary basins require special conditions for protection, es- ially when subjected to diastrophism. Much oil has been, probably, lost localities where periods of denudation broke the sedimentary cycle. The that survived usually owes its preservation to purely local factors. ordingly, the oil prospects of an area depend not only on the period of osition but also on erosional epochs. Both these factors should be con- ered in oil exploration. - V. S.

6. Krumbein, W. V. Sedimentary Maps and Oil Exploration. Trans. New York Acad. Sci., Lancaster, Pa., ser. 2, vol. 7, No. 7, 1945, pp. 159-166.

Sedimentation theory adopts increasingly a quantitative approach. Nu- ical expression is particularly valuable for mapping sedimentary proper- es. Some of these properties have already been mapped. Others, such as rticle size, average permeability, organic content, etc., make their ap- rance. The author classifies and discusses possible sedimentary contour os, some of them yet untried. Among their various applications, such maps be used in oil exploration. Particular groupings of sedimentary contours prove to be as significant in the search for stratigraphic traps, as osed contours were in the search for structural traps. The steeper slopes, instance, or the margins of steeper slopes, can provide indications on accumulation. - V. S.

7. Oaks, H. A. Function of the Aeroplane in Canadian Prospecting. Canadian Min. Met. Bull., Montreal, No. 395, 1945, pp. 135-145.

The airplane has played an increasing role in Canadian prospecting from 21 to 1939. The author reviews its past uses and future possibilities for connaissance, map photography, and transportation. From the characteris- cs of such work he deduced the requirements towards the designing of pros- cting planes and the costs involved. Different factors in airplane per- mance are considered, such as take-off, speed, floating capacity, ggedness, gross weight, pay load, power load, etc.; the data on 12 sea- anes used in northern Canada before the war are tabulated. The view is vanced that a flexible type of frontier plane should be developed for all- ound performance in exploration. Three groups of aircraft models are dis- ssed for such purpose: (1) Gross weight below 3,000 pounds, cost under ,000; (2) gross weight, 3,000 to 5,000 pounds, cost $10,000 to $20,000; and) gross weight, 5,000 and up, cost $25,000 to $38,000. - V. S.

8. Peyton, Garland. Prospecting for Oil and Gas in Georgia. Interstate Oil Compact Quart. Bull., Oklahoma City, Okla., vol. 3, No. 4, 1944, pp. 20-22; Oil, New Orleans, La., vol. 4, No. 11, 1945, pp. 13-14.

Geophysical exploration in Georgia's coastal plain has reached an all- me high in 1944. Throughout the year various oil companies have maintained geophysical crews of different types. The results of these surveys made possible a selection of sites offering promise for drilling. The geology of the coastal plain is briefly outlined. - V. S.

8149. Pirson, S. J. Genetic and Morphologic Classification of Reservoirs. Oil Weekly, Houston, Tex., vol. 118, No. 3, 1945, pp. 54-59.

This genetic and morphologic classification of oil and gas reservoirs is intended to serve as a helping tool for the geophysicist and reservoir engineer. It brings together the main conditions under which different types of reservoirs were formed and the diagnostic features for recognizing them by their geometry or external morphology. The material is embodied in three tables: (1) Petrologic or stratigraphic traps, (2) combination petrologic and structural traps, and (3) structural traps. Each table consists, in turn, of four columns: (a) Genetic and morphologic classes; (b) diagrams of cross sections; (c) diagnostic features for identification; and (d) typical examples of pools. A discussion of the classification, brief explanations of tabulations, and a bibliography of references accompany the tables. - V. S.

8150. Poisson, Yvon. Les essais de géophysique pour la mesure des propriétés des sols et terrains (Geophysical Tests for Measuring the Properties of Soils and Grounds). Génie civil., Paris, vol. 116, 1940, pp. 276-280, 291-294.

The methods used in investigating soil mechanics are described. They cover the gathering and storing of samples from cohesive and loose soils, the determination of water content, of porosity, of grain size, of the limits of plasticity and fluidity, of resistance to shear, of compressibility and permeability, etc. The principal apparatus used for these determinations are outlined. Some cases of mass distribution typical of soil mechanics are illustrated by graphs. - V. S.

8151. Rice, A. H. Air Photography in Geographical Exploration and in Topographical and Geological Surveying. Am. Jour. Sci., New Haven, Conn., vol. 243-A (Daly volume), 1945, pp. 486-494.

Air photography is of great value in reconnaissance surveys of large areas. The camera records geomorphological features which give clues to the underlying geological structures. Such usefulness of air photographs is exemplified by pictures taken during the Rio Branco-Uraricuera-Parima expedition of 1924-25. The inferences as regards general topography and structure to be gained from river craft, the only prior mode of access, are wholly different from those resulting from the true perspective aloft. Several major errors of deduction can be avoided. - V. S.

8152. Rust, W. M., Jr. Evaluation of New Geophysical Methods. Oil and Gas Jour., Tulsa, Okla., vol. 43, No. 48, 1945, p. 62.

Condensed from a presidential address delivered at the meeting of the
ciety of Exploration Geophysicists on April 4, 1945, in Tulsa, Okla. (for
ll text see Geophys. Abs. 121, No. 8022). - V. S.

53. Ter Braake, A. L. Mining in the Netherlands East Indies. Chapter 7: Oil. Netherlands and Netherlands Indies Council of the Institute of Pacific Relations, New York, Bull. 4, 1944, pp. 66-76.

Oil exploration in the Netherlands East Indies has centered chiefly in
e islands of Sumatra, Borneo, Java, and New Guinea. It has included geo-
gical and geophysical surveys. The latter were made by seismic, gravi-
trical, and electrical methods. They were used most extensively in the
amps of Sumatra, Borneo, and New Guinea. In some areas aerial mapping proved
be of much assistance. The areas surveyed and exploited are shown on a
p. - V. S.

54. Tiratsoo, E. N. The Influences of Structure on the Accumulation of Oil. Petroleum, London, vol. 7, No. 5, 1944, pp. 83-84.

The processes of oil formation and migration show that the most import-
t factor for eventual accumulation is geological structure. The animal
tter of oxygenless sediments in anaerobic waters is acted upon by bacteria,
us transforming fats and proteins into hydrocarbons. The weight of the
diments causes the connate water and oil in the lower strata to filter up-
rd. In this process the oil is retained in porous beds, sands, sandstones,
ssured limestones, and other porous mediums when they form suitable struc-
res. Such structures are the anticline, sealed monocline, facies field,
ns field, and salt-dome field; they are described. These structures can be
scovered by different geophysical methods. The seismic, gravitational,
gnetic, electrical, radioactive, and geochemical methods are briefly dis-
ssed. A table shows the structural classes of world's chief oil fields. -
S.

55. van Tuyl, F. M., and others. Developments in Geophysics. Colorado Sch. Mines Quart., Golden, Colo., vol. 40, No. 2, 1945, pp. 63-79, 109-112.

This review covers developments in geophysics during the year 1944. The
bjects treated are the scope of geophysical activities, trends in explora-
on, developments in techniques, well logging, contributions to regional
ology, and miscellaneous papers of geophysical interest. The material is
sed on some 30 reviews, reports, and investigations of different writers.
her publications are listed in a bibliography. - V. S.

9. NEW PUBLICATIONS

56. Coulomb, Jean, Editor. Annales de Géophysique, vol. 1, No. 1, 1944. Société de la Revue d'Optique Théorique et Instrumentale, Publishers, Paris, 1944.

A new scientific journal, "Annales de Géophysique," has appeared in Franc under the direction of Jean Coulomb, new director of the Institut de Physique du Globe and professor at the University of Paris. The first number contains original papers dealing with various aspects of geophysics: Indirect measurement of the density of rocks by means of the gravimeter, geomagnetic researche on the volcanic flow of Auvergne, etc. There are also included notes from laboratories and bibliographic reviews. - V. S.

8157. National Research Council, U.S.A. American Geophysical Union: Transactions of 1944. Washington, D.C., pt. I-VI, 1944-45, 1,066 pp.

The Transactions of the American Geophysical Union for 1944 have been issued in six parts. Of direct interest to exploration geophysicists are: (a) Part 2: Reports and papers of the General Assembly, of the Section of Geodesy, and of the Section of Seismology and Eastern Section of the Seismological Society of America; and (b) Part 4: Reports and papers of the Sections of Terrestrial Magnetism and Electricity, Oceanography, Volcanology, and Tectonophysics. Nonmembers wishing to purchase the Transactions should address orders, with checks payable to the American Geophysical Union, to General Secretary, American Geophysical Union, 5241 Broad Branch Road N.W., Washington 15, D.C., U.S.A. (A review of Transactions 1944 appears in Terrest. Magnet. and Atm. Electr., vol. 50, No. 2, 1945, pp. 163-164). - V. S.

8158. van Tuyl, F. M., Parker, B. H., and Skeeters, W. W. The Migration and Accumulation of Petroleum and Natural Gas. Quart. Colorado Sch. of Mines, Golden, Colo., vol. 40, No. 1, 1945, 111 pp.

The time of the origin and accumulation of oil and gas is considered briefly, and an analysis of the factors involved is given. Then rival explanations, together with experimental data favorable to each, are outlined and discussed. There follows a weighing of the theories, in which the views of the authors are supplemented by those of other contributors. In the conclusions the need for further studies of the problem of the origin and evolution of petroleum is stressed, and the inadequacy of much of the previous experimental work is pointed out. Finally, several broad generalizations and suggestions are offered regarding a more concerted and coordinated attack upon the problem. - (A review of this paper appeared in Econ. Geol., vol. 40, No. 2, 1945, p. 154.) - V. S.

10. PATENTS

8159. Method of Detecting the Penetration of an Oil-Bearing Horizon. J. G. Campbell, Houston, Tex., assignor to R. H. Fash, trustee, Fort Worth, Tex. U. S. Patent 2,361,261, issued Oct. 24, 1944.

The method of determining the penetration of an oil-bearing horizon in the drilling of a well, which consists in obtaining a sample of the drilling fluid entering the well and an independent sample of approximately the same

lling fluid leaving said well, adding equal amounts of an oil solvent per
t surface area to the surface of each sample to form a relatively thin
er of said solvent over the surface, subjecting the said samples to the
ion of ultra-violet light in order to cause the oil content thereof to fluo-
sce, the intensity of the fluorescence of said samples being in direct pro-
tion to the oil content thereof, and measuring any increase in the fluores-
se of the discharged drilling fluid sample as compared to the fluorescence
the sample of drilling fluid entering the well, to thereby detect the pene-
ation of an oil-bearing horizon, said thin layer of oil solvent on the sur-
e of each sample facilitating the observation of the fluorescent effect. -
ims allowed, 3.

0. Microphone for Conduits. L. C. Converse, Tulsa, Okla., assignor to Standard Oil Development Co., a corporation of Delaware. U. S. Patent 2,361,458, issued Oct. 31, 1944.

A device for acoustically logging bore holes comprising, in combination,
elongated container, a diaphragm transversely arranged in said container
h its periphery secured thereto to divide said container into a first and
second compartment, an actuating rod perpendicular to the plane of said
aphragm and secured thereto with an end of said rod extending into the first
an end extending into the second compartment, said ends being free to
rate, a means in the first compartment arranged to produce an electrical
nal which is a function of the vibration of the end of the rod extending
o the first compartment, and a vane in the second compartment perpendicu-
to the plane of the diaphragm and secured to the actuating rod, the wall
that portion of the container defining the second compartment being pro-
led with horizontally extending perforations adjacent said vane. - Claims
lowed, 3.

1. Method and Apparatus for Detecting Hydrocarbons. R. L. Doan, Bartlesville, Okla., assignor to Phillips Petroleum Co., a corporation of Delaware. U. S. Patent 2,362,805, issued Nov. 14, 1944.

A method of treating drilling fluid comprising confining a sample of the
illing fluid in a closed vessel, heating the sample in the vessel to a tem-
ature above the boiling point of the same whereby a superatmospheric pres-
e in the vessel results, flashing the heated drilling fluid under pressure
to a lower pressure zone, cooling the vaporous effluent of the flashing step
fficiently to condense water vapor present, adding an oxygen containing gas
the remaining vaporous effluent to form a mixture, and passing the mixture
a combustion zone to measure the combustible content. - Claims allowed, 5.

2. Gas Analysis and Combustion Chamber Therefor. C. C. Bies, Houston, Tex., assignor to Standard Oil Development Co., a corporation of Delaware. U. S. Patent 2,364,940, issued Dec. 12, 1944.

A method for the complete combustion of a combustible gas which comprises mixing the gas with an excess of oxygen, confining the mixture in a closed chamber at a subatmospheric pressure at which the mixture will glow under the influence of a high-frequency electric current, and subjecting the mixture in said chamber to the action of a short wave radiofrequency current. - Claims allowed, 4.

8163. Apparatus for Drilling-Rate Logging. Daniel Silverman and R. W. Stuart, Tulsa, Okla., assignors to Stanolind Oil & Gas Co., Tulsa, Okla., a corporation of Delaware. U. S. Patent 2,365,014, issued Dec. 12, 1944.

Apparatus for recording the rate of penetration of a drill bit through formations penetrated in the course of a rotary drilling operation per unit number of revolutions of said bit, including means for advancing a record strip proportional to the descent of said drill bit, means for producing a series of electric impulses in direct proportion to the number of revolutions of said drill bit, means actuated by descent of said drill bit for producing an electric current varying directly in average amplitude with the descent of said drill bit, means for recording on said strip a quantity varying directly with said current, and means controlled by said impulse producing means for periodically limiting the recorded amplitude on said strip. - Claims allowed, 3.

8164. Automatic Gain Adjusting Device for Reflection Seismographs. W. D. Mounce, Houston, Tex., assignor to Standard Oil Development Co., a corporation of Delaware. U. S. Patent 2,366,043, issued Dec. 26, 1944.

Seismic prospecting apparatus comprising means for converting seismic waves, the amplitudes of which decrease as a function of time, into electrical pulsations of corresponding amplitudes, a recorder connected to said means having in an electromagnetic field a plurality of responsive elements adapted to be activated proportionately to the amplitudes of the pulsations and means for increasing the electromagnetic field and, thereby, the responsiveness of said elements at a rate corresponding to the rate of decrease of the amplitudes of said pulsations. - Claims allowed, 5.

8165. Measurement of the Rate of Soil-Gas Evolution. J. L. Patton, Dallas, Tex., assignor to Socony-Vacuum Oil Co., Inc., New York, N. Y. a corporation of New York. U. S. Patent 2,366,351, issued Jan. 2, 1945.

The method of determining the rate of soil-gas emanation from earth below the water table into a borehole into which soil gas flows and into which the seepage of water is characteristic which comprises, sealing off a section of the borehole at a depth below the water table to form below the seal a gas-collecting chamber defined by the seal and the walls of the borehole below the seal, providing a passage for gas through the seal whereby soil gases emanating from the walls of the borehole defining the collecting chamber may pass through the seal and a separate passage for water with its inlet below the

let of the passage for gas, maintaining the level of seepage water in the
ttom of said borehole collecting chamber substantially constant and below
e opening of the gas passage by discharging seepage water tending to raise
e level of the pool through the separate water passage in the seal thereby
intaining a constant volume gas chamber whereby the soil gas collecting in
id chamber may have free access to the gas passage, and measuring the rate
emanation of soil gas from the second passage as a measure of the rate of
anation from the earth into the collecting chamber. - Claims allowed, 2.

66. Means and Method of Well Logging; J. C. Bender, Houston, Tex.,
assignor to McCullough Tool Co., Houston, Tex., a corporation of Nevada.
U. S. Patent 2,366,694, issued Jan. 9, 1945.

The method of logging boreholes comprising the steps of establishing
bstantially uniform temperature conditions within the fluid in the bore-
le, thereafter lowering a pair of spaced electrodes within the fluid, mea-
ring by an electrical connection through the lowering means the variations
the electrodes at any particular period during the lowering step, and si-
ltaneously adjusting the electrical resistance of the measuring circuit so
to compensate the measurements for the temperature gradient between ver-
cally spaced points in the earth. - Claims allowed, 6.

67. Automatic Volume Control for Recorder Amplifiers. O. S. Petty, San
Antonio, Tex. U. S. Patent 2,367,049, issued Jan. 9, 1945.

An amplifier for amplifying a train of (seismic) waves extending over
period of several seconds and in which an earlier arriving part of the
ain has a general amplitude level several times greater than the later ar-
ving part, and in which the level of the later arriving part of the train
adually decreases, comprising in combination an amplifier including a vari-
le gain thermionic valve, means to apply said train to said amplifier,
ans to deliver the amplified train, and means to automatically reduce the
in of said valve during reception of said earlier arriving part of the train
d thereafter to automatically return the gain to normal at a gradual rate
read over the greater portion of the period of reception of the later ar-
ving part of the train, whereby compensation is had for the normal decrease
amplitude of such later arriving part of the train, said last named means
cluding a source of bias voltage other than said waves, a condenser charged
om said source, and connections between said condenser and a grid of said
lve, and devices operable in response to variation in amplitude of said
ves for controlling said connections to connect said condenser to said grid
the reception of said earlier arriving part of the train. - Claims allowed,

68. Gravimeter Null Indicator; P. H. James, Houston, Tex. U. S. Patent
2,367,126, issued Jan. 9, 1945.

A device for determining forces of gravity over submerged areas which comprises a housing to be submerged, a mass therein movable as a function of the force of gravity thereon, a freely swinging support in said housing, a pair of light responsive elements and a source of light therefor also carried by said support, means operable by movement of the mass to affect the light cast by said source upon said responsive means, additional means suspending said mass in said support so that the force of gravity will effect movement of the mass and consequent movement of said first means, and means on the surface to indicate such movement as an indication of the force of gravity at the location. - Claims allowed, 3.

8169. Method of Prospecting for Buried Deposits; Eugene McDermott, Dallas, Tex. U. S. Patent 2,367,592, issued Jan. 16, 1945.

A method of geochemical exploration for subterranean petroliferous deposits which comprises collecting samples of soil at spaced points in the area to be investigated at a depth several feet below the surface, said depth being sufficient to eliminate the effect of surface conditions, determining the sulfate content of the respective samples, and determining the location of petroliferous deposits by selecting the significant high sulfate values and correlating the same with reference to the locations at which samples yielding such significant high values were obtained. - Claims allowed, 4.

8170. Method of Petroleum Exploration. J. G. Campbell, Houston, and R. H. Fash, Fort Worth, Tax., assignors to R. H. Fash, trustee, Fort Worth, Tex. U. S. Patent 2,367,664, issued Jan. 23, 1945.

In a method of exploring for subterranean oil deposits, the step of treating an earth sample containing petroleum oil in practically unweighable quantities and in adsorbed relation to water contained in the earth sample, which includes an extraction process using a relatively water-insoluble oil solvent having a work of adhesion to water greater than the work of adhesion of petroleum oil to water, whereby as a result of the said extraction process the solvent will thus contain the adsorbed oil previously contained in the earth sample. - Claims allowed, 14.

8171. Electrical Prospecting. H. C. Hayes, Washington, D.C. U. S. Patent 2,368,217, issued Jan. 30, 1945.

A method of determining the presence or the physical characteristics, such as the probable boundaries, the depth and the inclination, of an oil-bearing formation that comprises measuring at points along a profile line differences of electrical potential caused at least in part by the natural currents of the oil-bearing formation, plotting a curve the ordinates of which depend upon the said differences of potential and the abscissae of which depend upon the positions of the said points and, if the said curve is of a type that has a critical feature or features known to represent earth

otentials resulting from current streams arising from the peripheries of a
nown type of oil-bearing formation and known to indicate the presence or the
hysical characteristics, such as the boundaries, the depth and the inclina-
ion, of the known type of oil-bearing formation, determining, by analogy
ith the critical feature or features of the said curve of the said type that
s known to indicate the presence or the physical characteristics, such as
he boundaries, the depth and the inclination, of the known type of oil-bearing
ormation, the probable presence or characteristics of the first-named oil-
earing formation. - Claims allowed, 10.

172. Electrical Prospecting. H. C. Hayes, Washington, D.C. U. S. Patent 2,368,218, issued Jan. 30, 1945.

A method of determining the presence or the physical characteristics,
uch as the probable boundaries, the depth and the inclination, of an oil-
earing formation that comprises measuring at points along a profile line
ifferences of electrical potential caused in part by the natural currents
f the oil-bearing formation and in part by extraneous currents, correcting
he measurements to eliminate therefrom the influence of the extraneous cur-
ents, plotting a curve the ordinates of which depend upon the corrected dif-
erences of potential and the abscissae of which depend upon the positions of
he said points and, if the said curve is of a type that has a critical fea-
ure or features known to represent earth potentials resulting from current
treams arising from the peripheries of a known type of oil-bearing formation
nd known to indicate the presence or the physical characteristics, such as
he boundaries, the depth and the inclination, of the known type of oil-bearing
ormation, determining, by analogy with the critical feature or features of
he said curve of the said type that is known to indicate the presence or the
hysical characteristics, such as the boundaries, the depth and the inclina-
ion, of the known type of oil-bearing formation, the probable presence or
haracteristics of the first-named oil-bearing formation. - Claims allowed, 9.

173. Well Logging. J. J. Mullane, Tulsa, Okla., assignor to Standard Oil Development Co., a corporation of Delaware. U. S. Patent 2,368,486, issued Jan. 30, 1945.

A method for logging a borehole drilled for oil by the method in which
continuous circulation of drilling fluid is maintained between the surface
nd the bit which comprises arranging in said stream of drilling fluid a de-
ice sensitive to radioactive emanations and continuously recording the re-
ponses of said device to the materials in the said drilling fluid during
he drilling operation. - Claims allowed, 4.

174. Well Survey Method and Apparatus. R. E. Fearon, Tulsa, Okla., assignor to Well Surveys, Inc., Tulsa, Okla., a corporation of Delaware. U. S. Patent 2,368,532 issued Jan. 30, 1945.

In a device for geophysical exploration in which an instrument is lowered
nto an opening in the earth to measure characteristics of the surrounding

strata and a recorder is positioned at the surface to record the measurements, the improvement which comprises as means to connect the measuring instrument with the recorder and with at least one source of power also positioned on the surface, a cable connected to the measuring instrument and extending to the surface to support the measuring instrument and form an electrical connection thereto, a source of electrical current connected to said cable and the ground at the upper end of the cable, means at the measuring device connected between the ground and the lower end of the cable for receiving said current and utilizing it as power to operate the measuring device, means at the measuring device for impressing upon the surrounding earth and the supporting cable through filters that will exclude the main power supply current and each other, at least two alternating electrical currents of different frequencies, the phase relation and relative magnitude of certain components of said alternating currents being indicative of the state of said measuring instrument, means at the surface end of the cable for removing said indicating currents through similar filters, and means for recording the measurement made by the instrument as indicated by the said indicating currents. - Claims allowed, 11.

8175. Apparatus for Transmitting Seismic Signals. E. M. Shook and R. W. Olson, Washington, D.C., assignors, by mesne assignments, to Socony-Vacuum Oil Company, Inc., New York, N. Y., a corporation of New York. U. S. Patent 2,369,081, issued Feb. 6, 1945.

In a system for recording a time-break impulse that is indicative of the instant of detonation of an explosive charge to create seismic waves in the earth's surface having means for generating a voltage impulse coincidentally with the instant of detonation of the explosive charge, means for transmitting said voltage impulse to a point removed from the point of detonation of the explosive charge, the combination of means of said point actuated by the voltage impulse regardless of its polarity, for generating a second voltage impulse, means for recording the second voltage impulse as the time-break impulse on a trace of a seismogram, and means interposed between said second voltage impulse generating means and the recording means for blocking all signals generated subsequent to the impulse that is indicative of the instant of detonation, whereby other data can subsequently be distinctly recorded on the same trace. - Claims allowed, 9.

8176. Apparatus for Seismic Surveying. E. M. Shook and R. W. Olson, Washington, D.C., assignors, by mesne assignments, to Socony-Vacuum Oil Co., Inc., New York, N. Y., a corporation of New York. U. S. Patent 2,369,082 issued Feb. 6, 1945.

In a system for transmitting seismic signals and voice signals, the combination of a thermionic tube having an input circuit including a control electrode and an output circuit in which signals applied to said control electrode are reproduced, means for applying voice signals and an impulse indicative of the instant of creation of seismic waves to said control electrode and means operable immediately after application of said impulse to said electrode for preventing reproduction in said output circuit of signals and impulses later applied to said control electrode. - Claims allowed, 14.

-77. Well Logging. Alex Frosch, Houston, Tex., assignor to Standard Oil Development Co., a corporation of Delaware. U. S. Patent 2,369,550, issued Feb. 13, 1945.

A method for logging boreholes by measurement of the gamma-ray intensity erein at various levels which comprises moving a bomb containing a Geiger-üller counter along said borehole, delivering alternating-power current to id bomb, converting said current into direct current in the bomb, deliver-ng said direct current to the Geiger-Müller counter, transmitting the output f the Geiger-Müller counter to the surface through the same conductor which arries the alternating current to the bomb, and recording said output at the urface while excluding said power current from the recording circuit. - Claims llowed, 13.

178. Method and Apparatus for Logging Boreholes. D. G. C. Hare, New York, N. Y., assignor, by mesne assignments, to the Texas Company, New York, N. Y., a corporation of Delaware. U. S. Patent 2,369,672, issued Feb. 20, 1945.

The method of logging a borehole which comprises passing a detector of enetrative radiation through the hole, maintaining said detector in contact ith the side wall of said hole during said passage, recording variations in e intensity of radiation picked up by said detector as different formations re traversed, and simultaneously calipering the diameter of the hole oppo-ite said detector. - Claims allowed, 7.

179. Drill Mud Logging Recording System or the Like. R. W. Stuart, Fort Sill, Okla., assignor to Stanolind Oil & Gas Co., Tulsa, Okla, a corporation of Delaware. U. S. Patent 2,369,811, issued Feb. 20, 1945.

In apparatus for the indication of widely varying concentrations of sub-tances in the circulation fluid of rotary-drilling equipment indicative of hanges in the formations penetrated by said drilling equipment, including n electric analyzer for the concentration of such indicative substances and source of alternating current connected to said analyzer, a triode vacuum ube, a high resistance connected between the grid and cathode of said tube, eans for impressing across said high resistance a signal proportional to e output of said electric analyzer, said high resistance and said means onstituting the sole connections between the grid and the cathode of said ube, a second high-gain vacuum tube containing at least one cathode, grid nd plate, a second high resistance connected between said grid and cathode f said second high-gain tube, means for impressing the output of said triode acuum tube across the grid and cathode of said second high-gain tube, said econd high resistance and said last-metnioned means constituting the sole onnections between the grid and cathode of said second high-gain tube, a rec-ifier for rectifying the output signals from said second high-gain tube and eans for producing a visual indication of the rectified output from said ectifier. - Claims allowed, 1.

8180. Method and Apparatus for Logging Boreholes. D. G. C. Hare, Houston, Tex., assignor, by mesne assignments, to The Texas Company, New York, N. Y., a corporation of Delaware. U. S. Patent 2,370,162, issued Feb. 27, 1945.

The method of logging the formations traversed by a borehole which comprises lowering through said hole a plurality of radiation detectors disposed in separated vertical relation, said detectors being responsive to natural gamma radiation emitted by said formations, modulating a carrier wave by the output of each detector, the frequency of each carrier differing from those of the other carriers, transmitting said carriers over a cable to the surface, separating said carriers and recording the carrier modulated by each detector. - Claims allowed, 7.

8181. Amplifier. Gary Muffly, Penn Township, Allegheny County, Pa., assignor to Gulf Research & Development Co., Pittsburgh, Pa., a corporation of Delaware. U. S. Patent 2,370,483, issued Feb. 27, 1945.

A seismic amplifier comprising a pair of resistance-tuned circuits the inputs of which are in parallel, a plurality of coupled electron discharge tubes in each circuit, a bridge in each circuit, connections from each bridge to the grid of the first of said coupled electron discharge tubes, means for tuning the bridges to desired upper and lower frequencies, respectively, at which drop-off of response is desired, said bridges and connections providing inverse feedback of all other frequencies, whereby extraneous frequencies are eliminated, the outputs of said amplifier circuits being in opposition, resulting in a band-pass of desired characteristics within the range of the selected upper and lower frequencies. - Claims allowed, 10.

8182. System for Gas Analysis. W. M. Zaikowsky, Pasadena, Calif., assignor, by mesne assignments, to Consolidated Engineering Corp., Pasadena, Calif., a corporation of California. U. S. Patent 2,370,703, issued Mar. 6, 1945.

Apparatus for removing a gaseous component from a gaseous mixture comprising a closed circuitous path having at least two nonhorizontal portions, first means for condensing a gas component onto the walls of one zone of said conduit, and means for heating a gas in a second zone of said contuit to revaporize any condensed constituent passing through said first zone into said second zone, at least one of said zones being in one of said two nonhorizontal portions to maintain thermosiphon circulation in said conduit. - Claims allowed, 4.

8183. Geochemical Prospecting. Leo Horvitz, Houston, Tex., assignor to E. E. Rosaire, Houston, Tex. U. S. Patent 2,370,793, issued Mar. 6, 1945.

A method of geochemical exploration for subterranean petroliferous deposits which comprises collecting samples of soil at spaced points in the rea to be investigated at a depth several feet below the surface, said depth eing sufficient to eliminate the effect of surface conditions, subjecting he individual samples to an analysis for the determination of the content er unit weight thereof of a substance selected from the group consisting of onizable inorganic salts and the component ions thereof and correlating the ontents of the substance so determined in the respective samples with the ocations of the samples so that the possible existence of an area of petroeum deposit may be ascertained from the orientation of samples having anomaous contents of said substance. - Claims allowed, 20.

184. Method of Well Logging. J. A. Riise, Jr., Bartlesville, Okla., assignor to Phillips Petroleum Co., a corporation of Delaware. U. S. Patent 2,370,814, issued Mar. 6, 1945.

The method of investigating earth formations surrounding the bore of a roductive well comprising cleaning the well bore, introducing aqueous fluid ontaining surface tension reducing agents into the well bore until the hyrostatic head of the fluid is approximately equal to the formation pressure, lectrically logging the uncased portion of the well bore at intervals thereafter, and increasing the hydrostatic head of the fluid prior to each logging. Claims allowed, 6.

185. Electrical Logging of Well Bores. A. L. Smith, Houston, Tex. U. S. Patent 2,371,270, issued Mar. 13, 1945.

An apparatus for logging well bores comprising, a bare resistor, said esistor being of a high-resistance material having a low temperature coeffiient of resistance, insulated conductors attached to the ends thereof and lapted to lower the resistor within a well bore, a source of electrical enrgy connected to said conductors, so as to pass a current through the resisor where the resistor is of such greater length than the diameter of the ell bore that a substantial part of the current flowing through the conducors to the end of the resistor will flow through the earth formations adjaent the resistor and produce a current pattern in the liquid in the well ore and in the surrounding formations, and means for determining the fluctutions in the current pattern as the resistor is made to traverse the bore ole. - Claims allowed, 3.

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June 1946

UNITED STATES
DEPARTMENT OF THE INTERIOR
J. A. KRUG, SECRETARY

BUREAU OF MINES
R. R. SAYERS, DIRECTOR

INFORMATION CIRCULAR

GEOPHYSICAL ABSTRACTS 123

OCTOBER-DECEMBER 1945

WITH AN INDEX TO ABSTRACTS 120-123

COMPILED BY

V. SKITSKY

I. C. 7355,
June 1946.

INFORMATION CIRCULAR

UNITED STATES DEPARTMENT OF THE INTERIOR - BUREAU OF MINES

GEOPHYSICAL ABSTRACTS 123

October - December 1945[1]

Compiled by V. Skitsky[2]

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1. GRAVITATIONAL METHODS

8186. Aquilina, C. Determinazioni relative di gravita eseguite nel 1939 (Relative Determinations of Gravity Made in 1939). Ric. Ingegn., Rome, vol. 10, 1942, pp. 63-76.

In 1939, the author made a survey of relative gravity in the Mediterranean basin, 41° 35.5' to 41° 56.3' northern latitude and 0° 10.3' to 0° 28 longitude, referred to Mt. Mario. Ten stations were covered; 25 other stations had been occupied in the vicinity of Rome and in Albanian mountains during previous years. The new measurements revealed gravity anomalies ranging within the following limits: (1) With a free-air reduction, between + 29 and + 120 mgl., average + 60 mgl.; and (2) with a Bouguer reduction, between + 22 and + 87 mgl., average + 41.5 mgl. - V. S.

8187. Baranov, V. Mesure indirecte de la densité des roches à l'aide du gravimètre (Indirect Measurement of the Density of Rocks by Means of a Gravimeter). Annales de Géophysique, Paris, vol. 1, No. 1, 1944, pp. 18-24.

The average density of superficial rocks enters as a parameter into the reductions of gravimetric measurements. It can be determined from a sample of measures of "g" made with a gravimeter. A method of calculation is offered for this purpose. It takes into consideration topographic correctio and permits an easy appraisal of the errors committed when these do not exceed a few centimeters in absolute value. - Author's abs., translated by V. S.

8188. Bulanzhe, Iu. D. On the Accuracy of Variometer Surveys of Gravity Anomalies (in Russian). Bull. Acad. Sci. U. R. S. S. (Izvestiia), Moscow, Sér. Géogr. Géophys., vol. 8, No. 5, 1944, pp. 285-291.

In interpreting the gravity data of variometer surveys it is essential to take into account the possibility of accumulated errors of measurement. The problem of determining such errors is examined mathematically. Two formulas are derived for the calculation of the maximal average and relative errors, on the assumptions of a uniform distribution of variometer stations and an equal accuracy of observations. These formulas have been used for the calculation of errors made in surveying the anomaly at Ishimbaevo, Ural forelands. Computations showed that the measurements of anomalies of 1 to 2 mgl. were unsatisfactory. It is concluded that variometer surveys possess questionable accuracy and require for interpretation a detailed analysis of errors. - V. S.

Gutenberg, B., and Richter, C. F. Seismicity of the Earth (Supplementary Paper). Bull. Geol. Soc. America, Baltimore, Md., vol. 56, No. 6, 1945, pp. 603-668 (see abs. 8229 in this issue).

8189. Hastings, W. K. Gravimeter Operations in the Foothills Belt of Alberta, Canada. Geophysics, Menasha, Wis., vol. 10, No. 4, 1945, pp. 526-534.

As part of a gravimeter survey in western Alberta, Canada, the work was extended into quite rugged areas of the Rocky Mountain foothills belt. This paper outlines the general methods of operation, carried out on horseback from a movable camp, which were employed where conventional methods of using trucks were impossible. Gravity observations were made with a new small-type Gulf gravimeter, which, complete with batteries and other accessories, weighs about 48 pounds. The reduced gravity results were quite smooth and regular in spite of rugged topography and terrain corrections running up to 7 milligals. - Author's abs.

8190. Kazinskii, V. A. Summation of the Oscillations of Two Gravimetric Pendulums on a Ship (in Russian). Bull. Acad. Sci. U.R.S.S. (Izvestiia), Moscow, Sér. Géogr. Géophys., vol. 8, No. 6, 1944, pp. 381-384.

An equation is deduced for the oscillations of two gravity pendulums set in motion on a ship at sea. It is assumed that the ship undergoes only vertical and horizontal displacements in the plane of oscillation of the pendulums. The mathematical derivation is presented. The equation has the form:

$$l\ddot{\theta} + \sqrt{(g - \ddot{z})^2 + \ddot{y}^2} \cos\varphi_0 \sin\theta = 0.$$

Essential therein is the member $\cos\varphi_0$, accounting for the difference in amplitudes of oscillation. A comparison is made with the equation of B. C. Browne for the same phenomenon. - V. S.

8191. Khramov, D. N. An Experimental Test of the Hypothesis of Partial Isostatic Compensation (in Russian). Bull. Acad. Sci. U.R.S.S. (Izvestiia), Moscow, Sér. Géogr. Géophys., vol. 8, No. 5, 1944, pp. 281-284.

The author introduces into isostatic calculation a new parameter, ϵ, the degree of compensation, in accordance with Malkin's theorem. The criterion for a valid choice of ϵ is the condition of a minimum sum of squares in the declination of the isostatic anomaly for average values. To test this parameter, the gravimetric data of the Caucasus were subjected to recalculation in the light of Heiskanen's work. It was found that the result based upon the hypothesis of partial isostatic compensation are not any less accurate than the results based upon the hypothesis of absolute compensation, and that the Caucasus is about one-half compensated. - Author's abs.

8192. Kilchling, Karl. Ein dynamisch-elastischer Schweremesser (A Dynamical Elastic Gravimeter). Ztschr. Geophys., Braunschweig. vol. 18. 1943. pp. 51-52.

A dynamical gravimeter is described. It consists of a weight supported in part by spiral springs and in part by a cord. The cord is tightly stretched and swings transversely. The distribution of the load over the springs and the cord can be so adjusted that changes in gravity will affect only the tension of the cord. Measurements of gravity are made by determinin the duration of vibrations in the system. - V.S.

8193. Klaus, H. Torsion Balance Step Anomalies in Northern Tillman County, Oklahoma. Geophysics, Menasha, Wis., vol. 10, No. 4, 1945, pp. 507-525.

The results of a semi-detailed areal torsion-balance survey in Southwestern Oklahoma are shown by means of a gradient-curvature map, a gravity map, two second derivative contour maps, and gravity and second derivative profiles. Detailed quantitative calculations were made of a number of geological cross sections, two of which are shown on drawings. One of the drawings represents the surface situation with the highest probability rating since it combines a high degree of geological probability with the fact that it will reproduce the plotted gravity and second derivative curves very closely. This interpretation embodies a fault with a throw of the order of magnitude of 10,000 feet.

If such interpretation is substantially correct, it implies a thick sedimentary section in the down-thrown block, which might be of great economi interest in prospecting for oil. A comparison of the gravity and second derivative data may be of interest to the geophysicist. The geologist may find the results of this survey interesting because of their possible bearing on the orogeny of the Wichita Mountains. - Author's abs.

8194. Lustikh, E. N. On the Use of Gravitational Data in Reconnoitering Natural Resources. Compt. rend. (Doklady) Acad. Sci. U.R.S.S., Moscow, vol. 43, No. 6, 1944, pp. 242-243.

The interpretation of gravimetric data is possible even when they are inaccurate and insufficiently dense. For illustration, the author discusses the calculation of the limiting depth of a layer causing an anomaly indicated only by such imperfect data. He offers a solution based upon the relationship between the first and second derivatives of the gravity potential and certain limiting assumptions. Mathematical derivation is presented. The formulas thus deduced have been applied to the data of gravity surveys made in several areas of the Ishimbaevo region. The findings obtained on the depth of the roof of Kungurian rocks were subsequently confirmed by seismic exploration. - V. S.

8195.Nettleton, L. L., and Elkins, T. A. Relation of Magnetic and Density Contrasts to Igneous-Rock Classifications. Nat. Research Council, Am. Geophys. Union, Trans. 1944, pt. IV, Washington, D. C., 1945, pp. 662-666.

Maps show that many large gravimetric and magnetic anomalies nearly coincide. The authors have investigated the possiblity that such anomalies are caused by the same body of igneous rock in the basement. They determined the densities, magnetic susceptibilities, and intensities of magnetization of igneous rocks. The latter two determinations presented difficulties in the case of large bodies of rock, and they are discussed at length; an assumption was made that magnetic properties of igneous rocks are controlled largely by their magnetite content.

In the light of this work, data assembled from the writings of G. Grenet, L. Slichter, Kato, Nagata, etc., and from chemical analyses of igneous rocks were analysed statistically, and the rocks classified; the results are tabulated. The conclusions reached follow: "(1) A definite basis exists for the determination of susceptibility and intensity of magnetization of rocks from their magnetite content; (2) the possibility of determining magnetite content from chemical analysis opens access to a large volume of new data on magnetic susceptibilities and magnetization contrasts; (3) a reasonable range of probable magnetic and density contrasts within basement-rock has been established; and (4) a certain amount of association of magnetite content with density comes about through their mutual association with the chemistry of igneous rocks." It is believed that a better understanding of gravimetrically and magnetically surveyed areas should result from such investigations. (See also Geophys. Abs. 116, No. 7265.) - V. S.

8196.Oil Weekly. Geophysical Reconnaissance Work Under Way in Oklahoma. Houston, Tex., vol. 118, No. 8, 1945, p. 45.

An extensive geophysical reconnaissance campaign is under way in Oklahoma, with the greatest activity reported in the Anadarko Basin area in the western part of the State. Considerable work is also centering in the southern district, especially in Grady, Garvin, and McClain counties. 32 seismograph units and 6 gravimeter units are operating in Oklahoma, with Gulf Oil Corporation taking the lead and the Carter Oil Co. a close second. More units are headquartered at Chickasha than in any other town since the discovery of Magnolia Petroleum Co.'s deep distilate well east of the Chickasha gas area.

8197. Peters, J. W., and Dugan, A. F. Gravity and Magnetic Investigations at the Grand Saline Salt Dome, Van Zandt Co., Texas. Geophysics, Menasha, Wis., vol. 10, No. 3, 1945, pp. 376-393.

During May 1944, detailed gravity and magnetic surveys were made at the Grand Saline Salt Dome to secure additional information on the physical properties of this typical East Texas salt dome. The results of the surface gravity and magnetic surveys, and of the subsurface gravity survey in the Morton Salt Mine are illustrated and discussed. - Author's abs.

8198. Schleusener, A. Einige kritische Bemerkungen über die Bedeutung des vertikalen Gradienten für die Lagerstättengeophysic (A Few Critical Remarks on the Significance of the Vertical Gradient in the Geophysical Exploration of Deposits). Beitr. Angew. Geophys., Leipzig, vol. 9, 1942, pp. 303-319.

The author discusses the relative merits of vertical and horizontal gravity gradients. He finds that horizontal gradients, measured by torsion balance, are preferable for geophysical exploration. (1) With horizontal gradients, the anomaly gradient is almost as large as the normal gradient. On the other hand, with vertical gradients, the anomaly gradient constitutes only 1 percent of the normal gradient. Accordingly, it would be necessary to measure a normal vertical gradient of 3086 Eötvös with a precision of 1 percent in order to obtain its value within an error of ± 3 Eötvös. (2) In the case of an infinite subterranean band parallel to the surface, measurements of an anomaly made across the band by means of vertical gradients give an uncertain idea of the position of the band's edges; with horizontal gradients, however, the maxima and minima lie across the edges of the band. (3) Torsion-balance measurements are preferable for vertical gradients because they can be clarified by curvature values. - V. S.

8199. Sineriz, J. G. Estación gravimétrica observada en el Instituto Geológico y Minero de España con el gravímetro "Askania" (Gravimetric Station at the Geological and Mining Institute of Spain Uses Askania Gravimeter). Notas Comunic. Inst. Geol. Min. España, Madrid, No. 11, 1943, pp. 145-148.

An Askania electromechanical gravimeter has been acquired by the Geographical and Cadastral Institute, Spain. Among the purposes served was a linking of the gravity station at the Institute with the main gravity station of the Spanish net at the Astronomical Observatory. The Geological and Mining Institute quartered the intermediate station. Observations between stations were repeated back and forth. The results proved to be very satisfactory; the only variation in the measurements was 0.4 mgl. at the intermediate station. The gravimeter is described briefly; its precision and the quickness of the work are commended. - V. S.

200. Skillings' Mining Review. Submarines Useful in Oil Exploration. Duluth, Minn., vol. 34, No. 26, 1945, p. 6. Also: Mining Record, Denver, Colo., vol. 56, No. 42, 1945, p. 3.

The President of the United States has recently issued a proclamation stablishing federal jurisdiction over the natural resources of the country's ontinental shelf beyond the 3-mile limit. This action will permit the ederal Government to encourage the exploration of marine petroleum resources, elieved to be very considerable. Submarines equipped with gravimetric urveying instruments may be called into use, because oil-bearing structures pparently extend all the way to the 600-ft. water depth marking the external imit of the continental shelf. - V. S.

2. MAGNETIC METHODS

201. Bartels, J., and Burger, A. Potsdamer erdmagnetische Kennziffern (Potsdam Geomagnetic Index-Numbers). Ztschr. Geophys., Braunschweig, vol. 17, 1942, pp. 317-327.

Communication 12 presents Potsdam magnetic index-numbers for January - ctober 1942. The tables are organized in a new and more comprehensive form, ncluding indices EK$_1$, B, s, and K$_1$(P). The nature and calculation of the atter indices is indicated. - V. S.

202. Blum, V. J. The Magnetic Field Over Igneous Pipes. Geophysics, Menasha, Wis., vol. 10, No. 3, 1945, pp. 368-373.

In this paper, a brief summary of a magnetic survey of the Canon City, olorado, area is presented. The primary object of the article is to give he results of magnetic traverses over exposed igneous pipes which contain n appreciable amount of magnetite. These traverses reveal a magnetic low ear the geometric center of the tops of the pipes. Away from the center, he field increases in intensity and reaches its maximum strength along he southern edge of the intrusion. Small igneous pipes at or near the surface cause radical changes in the magnetic field within very short distances. - uthor's abs.

203. Bodle, R. R. Parícutin Magnetic Survey. Nat. Research Council, Am. Geophys. Union, Trans. 1944, pt. IV, Washington, D. C., 1945, pp. 628-630.

The U. S. Coast and Geodetic Survey made a magnetic survey in the region f Paricutin, Mexico. The investigation sought to determine whether any ocal changes had occurred in the earth's magnetic field as a result of this olcano's recent formation. The field party worked in the summer of 1943. ines were run to form a grid in the immediate vicinity of the volcano; bservations also covered the outer edges of a wider area of some 400 square iles. No outstanding anomalies were found. These results appear to indicate hat not all volcanic formations produce large local magnetic anomalies. - . S.

8204. Bozorth, R. M., and Williams, H. J. Effect of Small Stresses on Magnetic Properties. Rev. Mod. Phys., Lancaster, Pa., vol. 17, No. 1, 1945, pp. 72-80.

A study was made of the changes of magnetization that occur when very small stresses are applied or removed. It aimed at clarifying the behavior of magnetic materials in the apparatus containing them. The measurements obtained are reported. - V. S.

8205. Brunner, W. Final Relative Sunspot-Numbers for 1944. Ter. Magn. Atm. Electr., Baltimore, Md., vol. 50, No. 3, 1945, pp. 231-232.

Tables are presented giving the final relative sunspot-numbers for the whole disk of the sun for 1944, yearly means of relative numbers for 1933 to 1944, and the number of days without spots during the latter period. Graphs show the daily relative sunspot-numbers for 1944 and the previously obtained and smoothed monthly relative numbers for 1933 to 1944. - V. S.

8206. Haalck, H. Der Gesteinsmagnetismus (Rock Magnetism). Leipzig, Akad. Verlagsges., Becker & Erler Kom.-Ges., 1942, 90 pp. RM. 9.00.

This book deals with the physical properties and origins of rock magnetism, magnetism of rock samples, direction and magnitude of magnetization of considerable geological masses, and the relationship between rock magnetism and the magnetic field of the earth's crust. The view is advanced that the carrier of magnetism in rocks is principally magnetite; rock magnetism is generated by direct induction and depends upon the susceptibility of different rocks. The temperature also plays an important part; magnetization of rocks during their cooling through the Curie point brings about thermoremanent magnetism. The magnetizing force of the earth probably is supplemented by other, as yet unknown, local magnetizing forces. Total resulting rock magnetism in the earth constitutes at most 15 percent of the entire terrestrial magnetic field. Its direction generally corresponds to the direction of the terrestrial field. - V. S.

8207. Heylman, H. W., and Durbin, H. A. A Study of the Susceptibility of Sediments. Nat. Research Council, Am. Geophys. Union, Trans. 1944, pt. IV, Washington, D. C., 1945, pp. 543-555.

There is discussed a portion of the experimental work undertaken in studying the susceptibility-behavior of sedimentary cuttings obtained from bore holes. A rather elaborate system of heat treatment (employing temperatures well above the Curie point) of the cuttings was developed, and their susceptibilities were determined at various stages during the treatment. In general, it was found that many original sediments - principally shales - with little or no susceptibility became strongly magnetic by a proper heat treatment. As a result of the work, it became apparent that it is possible to use the susceptibility values after heat treatment to make stratigraphic correlations within a geological province. - Author's abs.

208.Knapp, D. G., and Howe, H. H. Magnetic Observatory Results at Cheltenham, Maryland, for 1935-36. U. S. Coast and Geodetic Survey, Washington, D. C., MO-22, 1944, 113 pp.

This publication contains extensive tables of observatory results, eproductions of magnetograms showing the more important magnetic storms, nd an explanatory text. The tabulated results include hourly mean values f the magnetic elements D, H, and Z, summaries of their monthly and annual eans, lists of principal magnetic disturbances, amounts of noncyclic change, bserved and adopted base-line values of the D, H, and Z variometers with heir abrupt changes, etc. The text includes a description of instruments, iscussions of their coefficients and behavior and of the procedures used, nd explanations of the various tables. - Authors' abs.

209.Kolin, Alexander. Mercury Jet Magnetometer. Rev. Sci. Inst., Lancaster, Pa., vol. 16, No. 8, 1945, pp. 209-214.

Mercury is allowed to flow through a narrow nonconducting pipe provided ith two pick-up electrodes at the ends of a diameter. In the presence of a agnetic field an e.m.f. is induced in the moving mercury. The potential ifference detected between the electrodes is due to the component of the ocal magnetic field perpendicular to the pipe axis and to the diameter along hich the electrodes are located. The device permits the establishment of he direction of the local field without introduction of a ferromagnetic body hich might distort it. The magnetic field intensity in a sharply localized egion can be determined. The instrument gives a direct reading proportional o the magnetic field intensity and lends itself to the study of rapidly arying transient fields as well as of constant ones. Fields of less than ne oersted can still be easily detected. The magnetic field can be measured bsolutely. Two ways of propelling the mercury are described. One of them tilizes gravity, and in the other method electromagnetic forces exerted pon a liquid conductor in a magnetic field are used. - Author's abs.

210.Magnée, I. de, and Raynaud, J. Étude Magnétique de la Tectonique du Cambrien du Brabant à l'Est de Court-St.Étienne (Magnetic Study of Cambrian Techtonics in Brabant to the East of Court-St.Étienne). Ann. Soc. Geol. Belgique, Liege, vol. 67, No. 3, 1944, pp. M495-M549.

A very detailed magnetic survey has been made with a view to elucidating rabant's Cambrian tectonics in the valley of the Orne between Court-St. tienne and Mont-St.Guilbert. In this region scattered outcrops indicate he course of the contact between the black schists of Mousty and the green etamorphic rocks of Devillien (a Tubize stratum). The problem consisted in etermining, in addition to Devillien's tectonics, whether their contact ith the black rocks is normal or faulted. The magnetometer is well suited or solving this problem because of at least three horizons of clay slate ontaining magnetite near the summit of Devillien and manifested by strong nomalies of the vertical component of the geomagnetic field at the base of heir outcrops. Isogam maps show these anomalies and permit the tracing of ontinuous interstratified magnetic horizons, even under a cover of Tertiary ands. The general character of Devillien is revealed as overthrusted and aulted. On the contrary, the zone of outcrops of the black rocks of Mousty s distinguished by an absence of notable magnetic anomalies.

A mathematical interpretation of the magnetic "profiles" permitted determining, among other features, the approximate dip, depth, and thickness of the magnetite deposits. A theoretical chapter describes a method of interpretation suited for analysing the experimental curves obtained over thick layers possessing a magnetic susceptibility higher than that of the surrounding ground. Interpretation made it possible to conclude that the erect Devillien has generally a direction N. 50° E. in the southern part of the surveyed region, NS. in the central part, and N. 35° W. in the extreme north. Thus, the strata form an arc, with its concavity open westward. The continuity of the horizons containing magnetite is interrupted in the south by a fault disposed approximately in the NS. direction. To the west of this fault no anomalies are found and, probably, there are only black rocks of Mousty, as is also indicated by rare outcrops. The fault cannot be traced northward because it becomes parallel to the general direction of Devillien. Beside this fault there are other accessory overthrust faults. - Authors abs. translated by V. S.

8211.Maree, B. D. Notes on Some Magnetometric Surveys with Special Reference to Anomalies on Karroo Dolerites. Trans. Geol Soc. South Africa, Johannesburg, vol. 46, 1943, pp. 107-118.

The magnetometric anomalies obtained on Karroo dolerites and the interpr tation of these anomalies are described. The use of the magnetometer for the selection of sites for water boreholes on granites is discussed, with additional reference to the delineation of a Karroo basin underlain by Bushveld granite. - Author's abs.

8212.McCampbell, J. C. A Geomagnetic Survey of Some Bladen County, North Carolina, "Carolina Bays". Jour. Geol., Chicago, Ill., vol. 53, No. 1, 1945, p. 66.

F. Melton and W. Schriever have advanced the hypothesis that the oval depressions in Bladen County, N. C., termed "Carolina Bays", have been caused by the impact of meteorities. If this were so, appreciable amounts of magnetic material should be found buried immediately below or close to the bays. The author recently made a magnetic survey in the locality of the bays to test this hypothesis. The results showed pronounced magnetic highs close to the bays indicating the existence of magnetic rocks below. The highs are described and mapped on a geomagnetic map. - V. S.

8213.McNish, A. G. Changes in the Solar-Diurnal Variations in Vertical Magnetic Intensity at the Huancayo Magnetic Observatory, 1922-1943. Nat. Research Council, Am. Geophys. Union, Trans. 1944, pt. IV, Washington, D. C., 1945, pp. 560-563.

The configuration of the earth's general magnetic field is believed to be a determining factor in diurnal variations. A confirmation of this view was obtained at the Huancayo Magnetic Observatory situated at the equator. Here large secular changes in vertical intensity occurred between 1922 and

943, and their effects on the diurnal variation were observed. Quiet days were selected for detailed examination, since they are most free from effects of magnetic activity. Even for these days a general shift in the phase of the variations was found as the sunspot-cycles progressed. The results of observations for two complete sunspot-cycles are presented. Findings bear out a previous prediction that Huancayo variations would assume more strongly the characteristics of the northern hemisphere. The relationship between secular changes in vertical intensity and differences in diurnal variations is explained in terms of the diurnal variation field of the western hemisphere. - V. S.

8214. Modriniak, N. A Preliminary Geophysical Survey of Part of the Whakatane District. New Zealand Jour. Sci. Tech., Wellington, vol. 26, No. 6B, 1945, pp. 327-331.

The intensity of magnetic force over a large part of the lowlands west and southwest of Whakatane is consistent with the geological interpretation that the hill country south of the flats continues northward under the deposits on the flats of pumice sand and silt of fluviatile and marine origin. Bores suggest that a strip of high magnetic values near the hot spring at Awakeri is due to a buried beach rich in iron sands. Seismic observations show that the loose deposits are at least 700 feet thick near Whakatane. - Author's abs.

8215. Ogg, A. The Comparison of Horizontal-Intensity Magnetometers. Ter. Mag. Atm. Elect., Baltimore, Md., vol. 50, No. 2, 1945, pp. 125-130.

The comparison of different types of horizontal-intensity magnetometers began in a previous paper (see Geophys. Abs. 122, No. 8079) is continued on the basis of further data. The instruments used are three La Cour horizontal-force magnetometers (QHM), a CIW magnetometer, an Adolf Schmidt standard magnetometer, and an F. E. Smith coil magnetometer; they are briefly discussed with regard to mathematical formulas, constants, and accuracy. The comparisons are made at first between the three QHMs. Then the coil magnetometer is compared with a QHM magnetometer, with the CIW magnetometer, and with the Schmidt magnetometer. The values observed and the findings of comparison are tabulated; findings are also plotted. The results show that the most consistent determinations are furnished by the La Cour magnetometers QHM. - V. S.

Peters, J. W., and Dugan, A. F. Gravity and Magnetic Investigations at the Grand Saline Salt Dome, Van Zandt Co., Texas. Geophysics, Menasha, Wis., vol. 10, No. 3, 1945, pp. 376-393 (see abs. 8197 in this issue).

8216. Rooney, W. J. Diurnal-Variation Anomalies at Tucson. Ter. Mag. Atm. Elect., Baltimore, Md., vol. 50, No. 3, 1945, pp. 175-184.

The seasonal changes in diurnal variation at Tucson, Ariz., possess an unusual interest because the observatory is in the transition belt where the type of variation changes markedly during the year. Generally, the Tucson monthly hodograms of diurnal variations in earth-current potential gradient show changes consistent with the recognized movement of the current systems in the ionosphere northward and southward with the sun. However, there exist, two definite anomalies less readily explained. These are discussed in detail, with illustrations of hodographs. - V. S.

8217. Rose, T. N. Secular Changes of the Earth's Residual Magnetic Field (in Russian). Inform. Sbornik Zemn. Magnet. Elektrich., Leningrad-Moscow, No. 5, pt. 2, 1940, pp. 6-10.

A comparison of the residual field obtained by the author for 1935.5 with Bauer's residual field of 1885.5 shows the general aspect of the field in northern Europe and Asia to have remained the same, except that it has increased in magnitude. - H. D. Harradon, Ter. Magn. Atm. Elec., vol. 50, No. 2 1945, p. 168.

8218. Skillings' Mining Review. Complete Magnetic Survey for Florida Oil. Duluth, Minn., vol. 34, No. 18, 1945, p. 13.

The U. S. Bureau of Mines has completed a magnetic survey of the Florida peninsula. 2,300 observations were made, one each mile, along 16 traverses or suitable routes in an area of some 50,000 square miles. The survey showed possible indications of oil in lower Florida. (See also Geophys. Abs. 122, No. 8077). - V. S.

8219. Stephenson, E. L. Magnetometer Surveys on Black Sands of the Oregon Coast. Bureau of Mines, Washington, D. C., Rep. Inv. 3814, June 1945, 18 pp.

In 1942 the Division of Geophysical Exploration, U. S. Bureau of Mines, cooperating with the Oregon G.M.I. Department, made several magnetic surveys of the black sands on the southwestern coast of Oregon. These sands underlie Pleistocene raised marine terraces and contain gold, minerals of the platinum group, ilmenite, magnetite, garnet, zircon, and particularly chromite. Known deposits were developed during the war. The surveys aimed at determining the efficiency of magnetic methods in tracing and outlining these deposits and in prospecting for new ones.

Exploration covered the areas of Cape Blanco, Geiger mine, and the coast south of Cape Arago; The local geology, technical problems, field work, and data are described. The measurements revealed several positive anomalies which either located the black sand directly or allowed tracing of it. As a result, known deposits were brought to fuller light, and new deposits were discovered; findings warrant exploratory drilling. The conclusion is advanced that the magnetometer used in conjunction with topographic studies seemingly offers the quickest and most economical means of locating new deposits. - V. S

3220. Thellier, E., and Thellier, O. Recherches géomagnétiques sur des coulées volcaniques d'Auvergne (Geomagnetic Research on Lava Flows in Auvergne). Ann. Geophys, Paris, vol. 1, No. 1, 1944, pp. 37-51.

The lava flows of Auvergne, France, were studied for the purpose of determining the direction of the geomagnetic field in the past. To devise a method, an inquiry was first made into the causes that could modify the initial magnetization of these flows. It pointed to the need of ascertaining the magnetic properties of corresponding rocks and checking on the uniformity of the lava's permanent magnetization. This approach was further applied in the field investigation of lava beds with a view to reconstructing the magnetic field at the time of flow. The beds selected were the apparently well-preserved Volvic bed and two basalt beds in a reverse condition. - V. S.

3221. Vestine, E. H., and Snyder, E. J. The Geographic Incidence of Aurora and Magnetic Disturbance, Southern Hemisphere. Terrestrial Magnetism and Atmospheric Electricity, Baltimore, Md., vol. 50, No. 2, 1945, pp. 105-124.

In the present paper, average features of geomagnetic disturbance and aurora in south polar regions are compared with those derived on the basis of more extensive data for high northern latitudes. The seasonal and yearly average of the disturbance daily variation (S_D) is obtained for various stations in Antarctic regions, and its variation in amplitude with latitude is compared with that for the northern hemisphere. These data are used to estimate the position of the southern zone of maximum auroral frequency, and the result is compared with available yearly frequencies of aurora. A particular aim of the investigation is the clear indication of present deficiencies in observational data, both magnetic and auroral, and of the regions most in need of additional observations. - Author's abs.

3. SEISMIC METHODS

3222. Alcock, E. D. The Review and Analysis of Seismic Data. Geophysics, Menasha, Wis., vol. 10, No. 3, 1945, pp. 338-344.

It is proposed that separate departments be established for the review and analysis of seismic data. The functions of these departments would be to review and submit independent interpretations of current seismic data, to review old seismic data in the light of new geological and geophysical developments, to compile and prepare regional seismic maps, and to investigate areas in which seismic and geological data do not conform. This paper discusses the benefits to be expected from such a program, the source of man power, and the costs. - Author's abs.

3223. Bell, A. H., and Kline, V. Oil and Gas Development in Illinois in 1944. Illinois Geological Survey, Press Bulletin Series, No. 52, 1945, pp. 293-334.

A statistical analysis is made of Illinois oil and gas development in 1944. It includes a differentiation of the wildcats drilled according to methods used for locating them; among geophysical methods, only the seismic had been used. The percentages of successful wells are as follows: (1) Geology, 16.11; (2) seismograph, 22.85; (3) geology and seismograph, 19.04; (4) unscientific methods, 10.17. In all, 430 wells were drilled; 85 percent of the locations had been selected by geology and seismograph. The amount of seismographic work in terms of party-months was 33; this is a drop of 40 percent from the 1943 level. - V. S.

8224. Birkenhauer, H. F. A Study of House Vibrations from Quarry Blasts. Bull. Seism. Soc. America, Berkeley, Calif., vol. 35, No. 3, 1945, pp. 99-115.

During the last six years the geophysicists of St. Louis University, Mo., investigated the seismic effects of quarry blasts upon residential structures. The method consisted in recording simultaneously the vibrations of different parts of a building and comparing them with the vibrations of the surrounding medium. It was effected by means of a geophysical prospecting camera which has a bank of galvanometers mounted opposite a strip of photographic paper revolving on a drum; each galvanometer is connected to a geophone by an electric cable. The equation for the motion of the geophone, at first deduced theoretically, was confirmed empirically by geophone shaking-table and building-vibration experiments; its mathematical derivation is presented.

Geophone observations on different types of buildings were made during six quarry blasts. The seismograms and computed vertical-displacement curves are discussed. They show that seismic vibrations from quarry shots of normal size at normal distances are not destructive of houses; moreover, when one panel vibrates at resonant frequency, the motion of the building is neither greater nor more destructive than at other frequencies. - V. S.

8225. Demetrescu, G. Remarques sur le tremblement de terre de Roumanie du 10 novembre 1940 (Remarks on the Earthquake of November 10, 1940 in Rumania). Compt. rend., Acad. Sci. Roum., Bucharest, vol. 5, 1941, pp. 224-242.

The investigation is not complete because observations from the important Russian stations have not been available. The epicenter 45°.8 N 26°.6 E has been obtained by construction in conic projection; pairs of stations with approximately equal arrival times for P waves were used. It is in the Vrancea region, near the bend of the Carpathians. The longitude is not so well determined as the latitude, owing to lack of stations to the east. The P transmission times, as plotted against epicentral distance, lie close to a smooth curve. Comparison with the curves, of Gutenberg and Richter shows that the depth of the earthquake is between 100 km. and 200 km. Macroseismically abnormal depth of the earthquake is indicated by the fact that it was felt with equal strength over wide areas. For other earthquakes in the same region, similar depths were found. The highest intensity observed was X, according to the scale published by the Central Bureau of the Int. Seismol. Assos. Isoseists have been drawn for Rumania and Bulgaria; their shape is found to be largely influenced by geologic conditions, the isoseists gathering very closely to the northwest of the epicentre, in the bend of the Carpathians, and spreading widely in other directions. At Moscow, at a distance of about 1,300 km. to the northeast, the degree of intensity is still V-VI. - I. Lehmann, Ztrbl. Geophys., Meteorol. Geodas., vol. 10, No. 4, 1943, pp. 186-187.

3226. Frenkel, Ia. I. Regarding the Theory of Seismic and Seismo-Electrical Phenomena in Moist Ground (in Russian). Bull. Acad. Sci. U.R.S.S. (Izvestiia), Moscow, Sér. Géogr. Géophys., vol. 8, No. 4, 1944, pp. 133-150.

The author applies seismic and seismo-electrical theory to moist ground treated as a porous body permeated by a continuous liquid. Equilibrium and motion in such a system are expressed by equations; two independent stress tensors are used for the solid skeleton and the liquid, and Darcy's law on the relationship between the flow of liquid and the resulting force of friction is modified to account for the compressibility of the solid body and for the forces of inertia in the case of irregular motion.

The linear equations of motion are further applied to seismic vibrations propagated in a moist ground in the form of longitudinal and transversal waves of small amplitude. A solution of these equations by successive approximations is discussed, and the first approximation, containing the first power of a small parameter characterizing the mobility of the liquid relative to the solid body, is worked out in detail. The velocity of propagation and the damping coefficient are also expressed mathematically; the latter is treated as a function of various parameters characterizing the structure and mechanical properties of the ground.

In conclusion, the general theory is applied to the electric vibrations associated with mechanical vibrations. These electric vibrations are generated by the differences between the velocities in the solid body and the velocities in the liquid; such differences produce changes in electro-kinetic potential at the surface of their contact. Refinements are made in the original calculations of the intensity of electric vibrations first developed by A. G. Ivanov, discoverer of the phenomenon. (English text in Jour. Phys., Moscow, vol. 8, No. 4, 1944, pp. 230-241). - V. S.

3227. Grenet, Gaston. Sur la régularité des mouvements d'horlogerie destinés à entrainer les enregistreurs de séismographes (On the Regularity of Clock Movements Designed to Activate Seismograph Recorders). Annales de Géophysique, Paris, vol. 1, No. 1, 1944, pp. 95-97.

Clock mechanisms activating seismograph recorders must possess a strictly uniform movement. J. B. Macelwane investigated this movement in 1932 and detected brisk variations of velocity in several seismographs (Geophys. Abs. 6, No. 1222). The author reports on his similar study at the observatory of Puy-de-Dôme, France. He measured the length of 100 minute-intervals on the seismograms of different seismographs and also found irregularities.

The data are treated statistically and tabulated together with the findings of Macelwane. They show that the clock mechanisms of modern seismographs have a precision of about 0.20 sec. The mechanism Brillée used at Puy-de-Dôme can be, apparently, improved to give a precision of 0.1 sec. neccessary for seismographs of short period. The synchronous motors are less precise than could be expected. - V. S.

8228. Gutenberg, B. Magnitude Determination for Deep-Focus Earthquakes. Bull. Seism. Soc. America, Berkeley, Calif., vol. 35, No. 3, 1945, pp. 117-130.

The magnitude of deep-focus earthquakes is so defined as to make the energy released in two shocks of the same magnitude equal, regardless of focal depth. Charts are given which, in connection with the equations for the magnitude of shallow shocks, permit the calculation of the magnitude of a shock at any given depth if the maximum ground amplitude and the corresponding wave period of P, PP, or S at a given epicentral distance are known.

It is found that the energies released in the longitudinal and transverse waves of an earthquake are about equal, regardless of focal depth. The "shadow zone" for P and S waves at epicentral distances near 10°, indicating a slight minimum in wave velocity at a depth near 100 km., has been confirmed, and quantitative results for amplitudes of P as a function of focal depth are given.

Earthquake magnitudes of 7.75 to 8.00 have been found throughout the range of focal depths, but, during the past 40 years, seem to have been relatively less frequent in deep-focus than in shallow shocks. In contrast with shallow shocks, no deep-focus earthquakes of magnitude 8.25 to 8.50 have been established thus far. This indicates (but does not yet prove) that at depth of about 100 to 700 km. roughly one-tenth as much energy can be stored as at depths of 15 to 40 km. At a depth of about 700 km. earthquake activity seems to stop abruptly.

The amplitudes of surface waves in deep-focus shocks decrease with increasing focal depth approximately as given by the theory. - Author's abs.

8229. Gutenberg, B., and Richter, C. F. Seismicity of the Earth (Supplementary Paper). Bull. Geol. Soc. America, Baltimore, Md., vol. 56, No. 6, 1945, pp. 603-668.

This paper supplements "Seismicity of the Earth" (Gutenberg and Richter, 1941). Additional epicenters for shallow and deep earthquakes are reported. Sixty-four great earthquakes are now identified for 1904-1943 and 201 major earthquakes for 1922-1943. New maps are given. Relative seismicity of active regions is discussed quantitatively (shallow shocks only). The Pacific belt has about 80 percent and the trans-Asiatic zone about 10 percent of the general activity. Earthquakes, volcanism, and gravity anomalies are discussed in their geographical and dynamical relation to structural arcs of Pacific type. These must be maintained by persistent processes in which subcrustal currents play a part. - Authors' abs.

230. Jones, W. M. The Application of P-Difference Methods of Epicentral Determination to New Zealand Local Seismology. New Zealand Jour. Sci. Tech., Wellington, vol. 26, No. 6B, 1945, pp. 359-365.

Using the travel times of P-phases given for near earthquakes in the effreys-Bullen 1940 tables, the differences in the times of arrival of the irst impulses at the Wellington and New Plymouth and at the Wellington and uai seismological stations are shown by series of curves, both for a surface ocus and for a focus of depth 160 km. The variations with focal depth of he epicentral positions given by the intersections of such curves are disussed and a method considered of obtaining an epicentre from the records f four stations independent of focal depth. - Author's abs.

3231. Jones, W. M. Determination of Epicentres in the South Pacific from Differences in the Arrival-Times of ScS. New Zealand Jour. Sci. Tech., Wellington, vol. 26, No. 6B, 1945, pp. 366-369.

The differences in the times of arrival of ScS at the Wellington and Suva and at the Wellington and Brisbane seismological observatories for arthquakes in the more important seismic region of the South Pacific are hown by series of curves for a surface focus. The positions of epicentres s determined by the intersections of such curves are not greatly affected y focal depth. - Author's abs.

3232. Kreis, Alfred. Die Beanspruchung des Gesteins in der Nähe von Sprengstellen (Rock Stresses Near a Blast). Verh. Schweiz. Naturforsch. Ges., Geneva, 1941, pp. 98-99.

A seismic study was made in mines on the relationship between rock stress and proximity to blasts. Two mine shafts near the power station at Innertkirchen, Switzerland, served for the investigation. Preliminary theoretical inquiry had demonstrated that the relation between the blast ressure and the shifts of rock particles would be affected by the distance to the blast; moreover, a phase displacement should take place because, in the vicinity of blasts, the pressure should decrease quicker than the amplitude of ground oscillations. The seismic measurements at the mines confirmed these deductions. - V. S.

3233. Lay, R. L. Repeated P-Waves in Seismic Exploration of Water-Covered Areas. Geophysics, Menasha, Wis., vol. 10, No. 4, 1945, pp. 467-471.

A secondary, and even a tertiary, P-wave has been observed under ertain conditions in seismic exploration of water-covered areas. It is hown that these events are caused by an oscillation at the shot point. he procedure for eliminating these disturbing phenomena is described. - uthor's abs.

8234.McComb, H. E., Gebhardt, R. E., and Wark, David. The Seismological Installation at the South Dakota State School of Mines and Technology, Rapid City, South Dakota. Nat. Research Council, Am. Geophys. Union, Trans. 1944, pt. II, Washington, D. C., 1944, pp. 309-313.

The new seismological installation at the School of Mines and Technology, Rapid City, S. Dak., uses a standard Wood-Anderson Instrument with certain innovations. A special device deflects the vane for damping tests; it consists of a small nozzle inserted through the back of the seismometer case and connected by a flexible rubber tube to a standard medicine dropper which can be depressed by means of a hinged lever with a stop screw to a predetermined amount suitable for the test. Another feature is a flat-vane suspension of 1 x 8 x 25 mm. provided with a plano-parallel, front-surfaced mirror and a reflection mirror to increase the sensitivity. Still other improvements are described. Graphs show the results of damping tests, sensitivity tests, and decay-curve tests. - V. S.

8235.Mining Journal, London. Oil in Great Britain. Vol. 224, No. 5713, 1945, pp. 100-101.

A paper, "Geological Results of the Search for Oilfields in Great Britain," by G. M. Lees and A. H. Tait, is presented in condensed form. (see Geophys. Abs. 122, No. 8099; a brief review of this paper was also given in Bull. Am. Assoc. Petrol. Geol., vol. 29, No. 9, 1945, pp. 1353-1354). - V. S.

Modriniak, N. A Preliminary Geophysical Survey of Part of the Whakatane District. New Zealand Jour. Sci. Tech., Wellington, vol. 26, No. 6B, 1945, pp. 327-331 (see abs. 8214 in this issue).

8236.Obert, Leonard, and Duvall, Wilbur. The Microseismic Method of Predicting Rock Failure in Underground Mining. Part 2: Laboratory Experiments. U. S. Bureau of Mines, Washington, D. C., Report of Investigations 3803, 1945, 14 pp.

A report is made of laboratory experiments on the origin of microseismims and the microseismic properties of various mine rocks. The total number of microseismims produced in the course of compressing a rock to failure was found to vary widely; coarse-grained rocks have generated, on the average, over a thousand microseismims, whereas the fine-grained rocks produced less than 200. Microseismic production depends largely upon the magnitude of the applied pressure. A part of production is also associated with the rate-of-change of pressure; this rate may be either negative or positive, the latter having the more pronounced effect. Moreover, some correlation can be established between total microseismic production and various characteristics of the rock. Other results are described. The data are insufficient for final conclusions. (For pt. 1 see Geophys. Abs. 121, No. 7978). - V. S.

il Weekly. Geophysical Reconnaissance Work Under Way in Oklahoma. Houston, Tex., vol. 118, No. 8, 1945, p. 45 (see abs. 8196 in this issue).

237. Riznichenko, G. V. On Reciprocal Points in the Seismic Method of Reflections (in Russian). Bull. Acad. Sci. U.R.S.S. (Izvestiia), Moscow, Sér. Géogr. Géophys., vol. 8, No. 2-3, 1944, pp. 87-92.

The author deals with the determination of the constant velocity f seismic waves propagated in conditions of a reflecting boundary of rbitrary form; hodographs of reflected waves recorded at two reciprocal ositions of the shot point provide the data. A mathematical demonstration s given to prove that this problem has one definite solution. The two - imensional case always possesses a single solution within certain limits f variability of the data when only reciprocal points are used. The three- imensional case is soluble on the condition of a certain relationship etween the data. For both these cases, formulas are deduced to determine he velocity of propagation; they are simple and can be applied in seismic xploration. - V. S.

238. Robinson, W. B. Refraction Waves Reflected from a Fault Zone. Geophysics, Menasha, Wis., vol. 10, No. 4, 1945, pp. 535-545.

Many records of a reflection project in Webb County, Texas, displayed vents showing excessive step-out times. These events are treated as refraction waves following a near-surface marker horizon, and their origin is hown to be associated with faulting, which was mapped by the ordinary eflections on the records. Possible confusion that may arise from failing o recognize these anomalous events is discussed, as well as the possibility f using the phenomenon to map faults. - Author's abs.

239. Sánchez, P. C. Some Volcanological and Seismological Conclusions Regarding Mexico and Central America. Nat. Research Council, Am. Geophys. Union, Trans. 1944, pt. II, Washington, D. C., 1944, pp. 316-318.

The author reviews volcanic activity in geological "Centro-America" xtending from latitude 19° northward to Colombia. He finds that the present ctivity is only the remnant and final manifestation of the volcanism of he Miocene; all the volcanoes of Centro-America pass now through their last ctive phase. The causes of such decadence and the possibilities of future ecrudescence are discussed. The view is advanced that volcanic and seismic henomena arise from an isostatic lack of equilibrium, which produces movements of variable intensity in the internal magma. In a comment, N. H. Heck uestions the early extinction of volcanic activity. - V. S.

240. Schneiderov, A. J. Earthquakes on the Expanding Earth (Summary). Nat. Research Council, Am. Geophys. Union, Trans. 1944, pt. II, Washington, D. D., 1944, pp. 282-288.

The results of research concerning seismic prediction of earthquakes are outlined and the exponential law of gravitation and its seismological and tectonic effects developed (Geophys. Abs. 118, No. 7517). The discussion covers such subjects as atoms between planets, electrostatic and gravitational forces, perturbations cuased in an electron-shell by a planet, liberation of shellar electrons, location of the expanding processes in the earth, inflation of the earth, and causes of earthquakes. The conclusion is reached that seismic prognosis of earthquakes should be based upon three methods. - geodetic, astronomical, and statistical; these are outlined briefly. The statistical method calculates from seismic records the average liberation of energy in a particular area; a lagging or advancing relative to this average furnishes data for a local prognosis. - V. S.

8241. Stulken, E. J. Effect of Ray Curvature Upon Seismic Interpretation. Geophysics, Menasha, Wis., vol. 10, No. 4, 1945, pp. 472-486.

With theory of seismic paths fairly well established, and with errors due to neglect of ray curvature considered in general terms or isolated examples by several authors, there remains a need for extended calculations measuring the effect of curvature. For a specific family of velocity functions, the inaccuracies of velocity computations based upon straight path assumptions are illustrated graphically. Discrepancies traceable to use of straight-line methods of depth, dip, and offset determination are likewise described.

Certain fallacies attending the application of simple curved path procedure to seismic prospecting are considered briefly, so that a reasonably fair evaluation of net importance of the ray curvature problem may be attempted. - Author's abs.

8242. Walter, E. J. An Extension of the Method of Numerical Integration of Seismograms to Include a Third Integration. Bull. Seismol. Soc. America, Berkeley, Calif., vol. 35, No. 2, 1945, pp. 71-79.

An abstract of this paper appeared in Transactions of the American Geophysical Union for 1944, pt. II, p. 289 (see Geophys. Abs. 122, No. 8110).

8243. Weatherby, B. B. Early Seismic Discoveries in Oklahoma. Geophysics, Menasha, Wis., vol. 10, No. 3, 1945, pp. 345-367.

Systematic seismic reflection shooting was begun on the Seminole Plateau of Oklahoma in 1927. In the beginning, the results were somewhat undependable, and well checks were disappointing. The various difficulties were gradually ironed out, so that with the discovery of South Earlsboro in 1929 and the North Extension of Carr City and West Seminole in 1930, new impetus was given to the use of the method. The history of these discoveries, together with maps and records, show the measure of success obtained at that time. - Author's abs.

4. ELECTRICAL METHODS

244.Carreno, Alfonso de la. A New Development of the Theory and Application of the Potential-Drop-Ratio Method of Electrical Prospecting. Nat. Research Council, Am. Geophys. Union, Trans. 1944, pt. IV, Washington, D. C., 1945, pp. 575-584.

The author reviews the existing varieties of the potential-drop method and offers a new alternative, the "potential-drop ratio" method. In the latter, the intervals between electrodes A and C and C and B are different, and both increase according as the distance from C to E_1 is augmented; but the ratio r/a remains constant: $(r_0/a_0) = (r_1/a_1) = (r_2/a_2) = \ldots = (r_n/a_m)$ = R. This device permits the computation of a continuous curve of apparent resistivity under conditions of constant sensitivity; it is especially advantageous in vertical sounding. The author compares his method with the procedures of constant and expanding electrode separation; a mathematical treatment carries the comparisons in general terms and in application to the two-layer problem. General equations are discussed, special equations deduced for the potential-drop ratio, and graphs drawn to represent the variables. - V. S.

3245.Dahlberg, R. S., Jr. An Investigation of Natural Earth Currents. Geophysics, Menasha, Wis., vol. 10, No. 4, 1945, pp. 494-506.

An attempt was made to obtain relative apparent resistivities by measuring the potential gradients produced by natural earth currents. Alternating components in the range 0.5 to 10 cps. were measured.

The results of two surveys in Oklahoma are shown, and various perturbing factors are discussed. The conclusion is reached that the method is not likely to replace conventional resistivity methods. Author's abs.

3246.Enslin, J. F. Basins of Decomposition in Igneous Rocks: Their Importance as Underground Water Reservoirs and Their Location by the Electrical Resistivity Method. Trans. Geol Soc. South Africa, Johannesburg, vol. 46, 1943, pp. 1 - 12.

Most of the extractable underground water in igneous formations is stored in the decomposed rock. Basins of decomposition can be located by the electrical resistivity method; and bore-hole sites can be selected accordingly. The electrical resistivity instrument and method are described briefly, and their application is illustrated by a discussion of some actual surveys. In addition, some statistics concerning the bore holes drilled in igneous rocks in South Africa are given. - Author's abs.

3247.Fritsch, Volker. Messverfahren der Funkmutung (Methods of Measurement in Radio Prospecting). München and Berlin, Verlag von R. Oldenburg, 1943; published in the U.S.A. by Edwards Brothers, Inc., Ann Arbor, Mich., 1945, 220 pp. Price, $5.85.

The techniques of measurement used in radio prospecting are described for the first time in organized, comprehensive book form. The author consider that theory and apparatus have achieved a development sufficient for practical application. He examines critically the evidence furnished by his experiments during the last 12 years. On this empirical basis are formulated the principles, problems, and assumptions of radio prospecting. The chief methods are described, such as absorption, frequency, reflection, compensation capacity, resistance, diagram, dielectrical constant, conductivity, radiation, and expansion. A discussion is devoted to sources of error. Finally, examples of application are given. A bibliography is appended. – V. S.

8248. Maher, J. C., and Jones, P. H. Ground-Water Exploration at Alexandria, Louisiana. Econ. Geol., Lancaster, Pa., vol. 40, No. 3, 1945, pp. 164-182.

The impending danger of a water shortage in Alexandria, La., has required the development of a new well-field in the Bayou Rapids area. Preparatory exploration in 1942 consisted of drilling, electric logging, testing of six experimental holes, etc. The electrical logs are discussed briefly with respect to underlying principles, self-potential and resistivity curves, and interpretation, with illustration by samples of curves. An analysis of logging results and other findings is aimed at clarifying local geology and determining the sites of wells. – V. S.

8249. Rama Rao, B. Annual Report for the Year 1941-42. Mysore Geological Department, Records, vol. 41, 1942; Bangalore, 1943, pp. 1-15.

An area of about 125 acres situated near Gonur-Gollarahatti and Guddadarangavvanahalli in the Chitaldrug district was surveyed by electrical methods. Measurements were made along 20 lines totaling 34,700 feet (or nearly 6½ miles) in length; the number of determinations carried out was 485. In the area surveyed during the year no indications were found suggesting the occurrence of any concealed ore bodies.

8250. Schenk, Erwin. Über Lagebestimmungen steiler geologischer Grenzflächen im Untergrund durch Gleichstrommessungen (Concerning the Localization of Steep Geological Boundary-Surfaces in the Subsoil by Means of D.C. Measurements). Ztschr. pract. Geol., Halle, vol. 50, 1942, pp. 93-99.

Electrical exploration often deals with steep geological boundary surfaces. The problem and methods of determination are discussed in the case of D.C. measurements. The problem has three phases: Detecting the locus of the electrical disturbance, determining the strike and dip of the surface, and exploring the characteristics of the surface. The methods employed are horizontal sounding and vertical sounding; they are illustrated by several examples. Much prudence must be exercised in the interpretation of electrical disturbances because local inhomogeneities in the upper layers can be confused easily with boundary surfaces in the deeper subsoil. – V. S.

5. RADIOACTIVE METHODS

251.Baranov, V. I., and Novitskaia, A. P. The Radioactivity of the Sungul Peat-Muds (in Russian). Bull. Acad. Sci. U.R.S.S. (Izvestiia), Moscow, Sér. Géogr. Géophys., No. 3, 1943, pp. 173-180.

The radiochemical analyses of medical muds in the Soviet Union have hown on the average, a radium content of n.10^{-11} and a thorium content of .10^{-4}0/0 (for dry mud). The peat muds of the health resort of Sungul, iberia, must be noted for an exceptionally high content of radium, up to .10^{-9}0/0. Theoretically, the most probable causes for such concentration ould be a high radium content in the waters washing the peats, a marked bsorptive capacity of the peats for radium, and a considerable circulation f the water through the peats. All these conditions are found to exist n Sungul. - V. S.

252.Blau, M., and Dreyfus, B. The Multiplier Photo-Tube in Radioactive Measurements. Rev. Sci. Instr., Lancaster, Pa., vol. 16, No. 9, 1945, pp. 245-248.

An improved method for the measurement of alpha-ray sources, using the uminescence of fluorescent screens, is described. The improvements consist f the use of a multiplier photo-tube and long-lived non-emanating alpha-tandards. The chief advantage of the multiplier photo-tube is its great lexibility, allowing quite an extensive range of measurements. Alpha-ray ources ranging from 1/10 μ up to a few curies can thus be measured in uicker fashion than either the ionization or calorimetric method would ermit. The standardization procedure of the photo-tube for measurements f absolute intensity is described in detail, the accuracy of the results eing estimated at 5 percent. New applications of this method to the prepara-ion of photometric standards and to the measurements of strong neutron ources are suggested. - Authors' abs.

253.Bothe, W. Die Geigerschen Zählmethoden (The Geiger Counting Methods). Naturwiss., Berlin, vol. 30, 1942, pp. 593-599.

A brief outline is presented of the development of point counters and ube counters. Methods and applications are discussed. - V. S.

254.Campbell, J. L. P. Radioactivity Logs Provide Vital Data for West Texas - New Mexico Operations. Tomorrow's Tools - Today, Los Angeles, Calif., vol. 11, No. 3, 1945, pp. 4-9, 27, 34.

Radioactivity logging is in considerable use in west Texas and New exico. Technical difficulties here are due to the heterogeneity of local rmations; moreover, in west Texas several hundred feet of salt must be aversed by the log. The equipment typically used comprises gamma-ray and eutron instruments. The first measures the relative intensities of natural gamma rays from each formation; the second, the amount of hydrogen manifested at neutron-bombardment. The curves obtained are discussed with regard to their characteristics, complementariness, and advantages over electric logs. Their data have proved very valuable in well workovers, completions, secondary recoveries, etc. As illustrations, examples of correlation work in Fullerton field and Howard-Glasscock field are described and samples of logs shown. - V. S.

8255. Fearon, R. E. Radioactivity Well Logging; Part 1, Gamma Ray Measurements; Part 2, Neutron Bombardment of Formations. Oil Weekly, Houston, Tex., vol. 118, 1945, No. 1, pp. 33-42, No. 2, pp. 38-44.

The purpose of this series of two articles on radioactivity well logging is to remedy the lack of clear, comprehensive discussion of the important technical matters and the theory that pertains to this relatively new well-logging method. The series has been prepared to touch the "high spots" as concisely as possible, yet give sufficient understanding of the underlying theory and application objectives so as to enable readers better to comprehend the meaning of gamma-ray well logging. For a more complete treatment of radioactivity, readers are referred to the extensive references that accompany the articles. - Author's abs.

8256. Kovach, E. M. An Experimental Study of the Radon Content of Soil Gas. Nat. Research Council, Am. Geophys. Union, Trans. 1944, pt. IV, Washington, D. C., 1945, pp. 563-571.

All the solid constituents of the earth have minute admixtures of radioactive substances and give off emanation. Accordingly, the soil gases that fill the capillaries of the earth must contain radon and thoron. The present study at Fordham, N. Y., seeks to establish a connection between the fluctuations of the soil's radon content and the variations of penetrating radiation from the ground studied by V. F. Hess. Three pipes were lowered into the ground to depths of 25, 75, and 150 cm. respectively. For 69 days the radon content of the soil gas was measured in these pipes simultaneously by means of an ionization apparatus. The following conclusions are drawn at this phase of the experiment: (1) Radon content in soil gas increases with freezing and decreases with water soaking of the ground; (2) dry ground produces stability within the three layers studied; radon content if found to increase with depth; and (3) atmospheric influences are secondary to the ground conditions of the soil. - V. S.

8257. Russell, W. L. Relation of Radioactivity, Organic Content, and Sedimentation. Bull. Am. Assoc. Petrol. Geol., Tulsa, Okla., vol. 29, No. 10, 1945, pp. 1470-1494.

A comparison between the radioactivity and organic content of 510 sample of sedimentary rocks indicates a marked relation between certain types of organic content and radioactivity. Marine oil shales are associated with ceptionally high radioactivity; coals with abnormally low radioactivity, d other types of organic matter with intermediate radioactivities. An alysis of the material balance between sedimentary and igneous rocks dicates that the sediments should have about the same radioactivity as the neous rocks from which they were derived; the averages of the writer's sts seem to confirm this conclusion if the igneous source of the sediments sembles a granite. An analysis of the data bearing on the radioactivity deep-sea deposits and oil shales gives no evidence of general increase radioactivity with slowness of deposition. The bearing of the new data the origin of oil and of the helium in natural gas is discussed. - thor's abs.

58. Velden, H. A. v. d., and Endt, P. M. On Some Fluctuation Problems Connected with the Counting of Impulses Produced by a Geiger-Müller Counter or Ionization Chamber. Physica, Hague, vol. 9, No. 7, 1942, pp. 641-657.

In the present article we shall deal with some quantities which are of portance in counting the kicks of a Geiger counter or ionization chamber ising from some constant or decaying radioactive source. We will first rive the sensitivity and the statistical fluctuations of the counting-rate ter, using the direct method first indicated by Ornstein and a more classi- l method for one special case. We also wish to calculate some of these antities for the case of a scaling set and a mechanical recorder with nite resolving powers. It is shown that in this case the fluctuations are eater (but not much) than in the case of infinite resolving powers. - thors' abs.

6. GEOTHERMAL METHODS

59. Kovner, S. S. On the Theory of Thermal Prospecting: Artinskian Massif Revealed on the Slope of a Gravitational Maximum. Compt. rend. (Doklady) Acad. Sci. U.R.S.S., Moscow, vol. 42, No. 6, 1944, pp. 262-264.

Artinskian limestone domes are not uncommon in some regions of Second ku, middle Volga. The author previously showed that geothermal surveys n detect them (Geophys. Abs. 115, No. 7188). He now analyses an Artinskian ructure situated on the slope of a gravity high. It is known to lie at a pth of 1,200 m. and has Kungurian salt 800 m. thick on one limb and Ufa dstone on the other limb; the Ufa deposits also cover the salt and cause e anomaly. Coefficients of heat conduction for these rocks were taken from e work of Kolesnikov (op. cit.); the figures are cited. They served for lculating the thermal fields of two cross sections, one through the dome d the other outside of it. A normal mean geothermal step of 3° C. per 100 was assumed, with temperatures equal to zero at the surface and to 48° C. the depth of 1,600 m. Computations followed the method of nets applied the Dirichlet-Neuman problem for the profiles (Geophys. Abs. 114, No. 66; 115, Nos. 7188, 7189).

The thermal curves obtained revealed marked temperature differences between the two cross sections, both for depths of 100 m. and 200 m. Curves plotted of differences repeated the configuration of the dome; in the curves for 100 m. the high was 0.54° C., for 200 m., 1.13° C., and both corresponded to the apex of the dome situated 400 m. below. It is concluded that geothermal measurements can detect Artinskian domes; gravitational, seismic, and electrical methods meet with difficulties. - V. S.

8260. Kraskovsky, S. A. Measurements of Temperature in Salt Mines (in Russian). Bull. Acad. Sci. U.R.S.S. (Izvestiia), Moscow, Sér. Géogr. Géophys., No. 3, 1943, pp. 134-142.

In 1940 the author measured the temperature in Russian salt mines with a view to developing a method for geothermal studies. A mercury thermometer was used, with its bulb wrapped in rubber and wool to increase thermal inertia. The surveys included laboratory research. (1) It was found that thermometers required the following exposure for registering the temperature of the surrounding medium: 70 min. in the air, 52 min. in dry sand, and 60 min. in salt within a sample hole. The problem and methodology of the retardation constant are discussed. (2) The thermal coefficients were determined on two specimens of salt by the method of constant conditions. These coefficients, particularly thermal conductivity, enabled the author to compute the time during which a certain change occurs in the temperature of a given point and the velocity with which a given temperature propagates to a certain depth in the salt; the calculations are given and the results tabulated. No thermal gradients were determined, because the shafts could not be bored. - V. S.

7. GEOCHEMICAL METHODS

8261. West, S. S. The Relative Abundance of the Carbon Isotopes in Petroleum. Geophysics, Menasha, Wis., vol. 10, No. 3, 1945, pp. 406-420.

The relative abundance of the isotopes of carbon has been measured in samples of oil and gas from 32 wells in the Silica and Ellinwood fields of Barton and Rice Counties, Kansas, and 3 wells in Oklahoma, Texas, and Wyoming, as well as in surface vegetation, hydrocarbons from well cuttings, and carbon dioxide absorbed from soil. For the samples from Silica and Ellinwood Fields, $C^{12}/C^{13} = 94.1 \pm 0.4$. Relative abundance appears to be independent of the source of petroleum, but is about 1.6 percent lower for vegetation. It is concluded that this quantity cannot be used to distinguish sources of petroleum, and that its use to determine the origin of soil hydrocarbons requires an accuracy of measurement not hitherto attainable. - Author's abs.

8262. Wilson, H. D. B. Geochemical Studies of the Epithermal Deposits at Goldfield, Nevada. Balch Graduate School of the Geological Sciences, California Institute of Technology, Pasadena, Contr. 354; also Econ. Geol., Lancaster, Pa., vol. 39, No. 1, 1944, pp. 37-55.

Approximately 50 samples of vein material and wallrock from the ore eposits of Goldfield, Nev., were quantitatively analyzed by means of the pectrograph to determine whether the quantitative distribution of certain lements would give some clue to the loci of mineralization. It has been stablished that three elements, bismuth, silver, and tin, are genetically ssociated with gold values in the deeper veins. These elements are deterinable even in very low-grade vein material. — Author's abs.

8. UNCLASSIFIED METHODS AND TOPICS RELATED TO GEOPHYSICS

263. Brant, A. A. Review of Geophysical Work Carried Out by the Ontario Department of Mines, 1937-1944. Ontario Dept. Min., mimeo. report, Nov. 15, 1944, 5 pp. (deposited in the Geological Survey Library, Washington, D. C.)

This paper was subsequently printed anonymously, under a modified itle, in Northern Miner, vol. 30, No. 39, 1944, p. 11 (see Geophys. Abs., 20, No. 7891). A review appeared later in Bull. Imp. Inst., vol. 43, No. , 1945, pp. 133-136. — V. S.

264. Gross, H. E. Marine Petroleum Possibilities. Petrol. Eng., Dallas, Tex., vol. 16, No. 11, 1945, pp. 76-82.

The continental shelf has recently attracted considerable attention ecause of its petroleum potentialities. The author discusses these with he aid of his maps. (1) A map of the entire world shows that continental helves run out as far as 150 miles offshore without becoming deeper than 00 feet. They aggregate an area approximating the size of the United tates. Tentative geological estimates have indicated that this territory ould yield the same ultimate production of about 50 billion barrels of etroleum. The prospective drilling areas are largest in the U.S.S.R. and mallest about Lake Erie. (2) Two maps of the Great Lakes in North America how the surrounding oil and gas fields. The geology of the lakes is iscussed. Four localities appear promising for under-water prospecting: estern end of Lake Erie, northwest half of Saginaw Bay, east side of Lake ichigan between Benton Harbor and Ludington, and shallow south end of Lake uron. — V. S.

265. Grossi, Mario. Considerazioni geologiche e geofisiche sui giacimenti metaniferi (Geological and Geophysical Considerations Regarding Deposits of Methane). Metano, vol. 4, No. 14, 1942, pp. 13-23.

Methane deposits have often been found near oil fields. These accumuations are also usually located in the fractured zones of the earth's crust ypified by fissures, faults, and volcanoes. Inversely, fractured zones ppear to be geologically related to oil and gas accumulations; marked imilarities exist between oil and gas regions and fractured regions. This lose relationship leads the author to conclude that oil and gas should be ought in fractured zones. Such geology is in itself favorable to processes f accumulation. — V. S.

8266. Illing, V. C. Role of Stratigraphy in Oil Discovery. Oil Gas Jour., Tulsa, Okla., vol. 44, No. 16, 1945, pp. 125-129.

The author outlines his address delivered at a meeting of the A.A.P.G. at Tulsa, Okla., in March 1945 and published in full in the Bull. Am. Assoc. Petrol. Geol., vol. 29, No. 7, 1945, pp. 872-884 (see Geophys. Abs. 122, No. 8145).

8267. Krumbein, W. C. Recent Sedimentation and the Search for Petroleum. Bull. Am. Assoc. Petrol. Geol., Tulsa., Okla., vol. 29, No. 9, 1945, pp. 1233-1261.

The thesis of this paper is that sedimentary characteristics will become increasingly important in the search for oil. Emphasis is placed on the increase in quantification of sedimentary data, new and more complete studies of sedimentary environments, application of the techniques to ancient sediments, and the development and improvement of methods for recording the quantitative data in map form. A brief review is given of some trends in modern sedimentation, illustrated by particle roundness and sphericity, as an introduction to quantitative sedimentary studies. The viewpoint is extended to environments of sedimentation approached as "closed systems" with boundary conditions, materials, and energy sources as the basic subjects of study. The data of quantitative environmental studies lend themselves to presentation on contour-type maps and surfaces, and some of the geometrical properties of such maps and surfaces are reviewed. A classification of maps is given, to indicate the wide range of sedimentary data, both recent and ancient, suitable for presentation in this manner. - Author's abs.

8268. Krynine, P. D. Sediments and the Search for Oil. Pennsylvania State College, Mineral Industries Experiment Station, Tech. Paper 101, 1945, 9 pp. Price, 10 cents.

Oil deposits of the petrologic type, or stratigraphic traps, predominate in Pennsylvania. To find a method for detecting them, the author investigated the origin and composition of sediments. His findings show that sediments are mechanical mixtures of chemical and detrital fractions. The detrital fraction is formed along a triple line of descent, producing the series of orthoquartzite limestones, graywackes, and arkoses. During each diastrophic stage a balance exists between the formative processes, and an average normal sediment is formed. If, however, some of the formative processes become excessive, abnormal sediments result; these are termed differentiation end-phase concentrates.

Significantly, the investigation also revealed that the reservoir rocks of oil fields are not normal quartzites, graywackes, or arkoses but end-phase concentrates within these series. The author concludes that there exist two varieties of oil concentration: (1) A final concentration within a structural high, and (2) a preliminary concentration during an earlier petrologic stage in amounts sufficient to make final concentration possible but conduciv to abnormal sedimentation of the end-phase type. The latter phenomenon offers a possible guide for detecting stratigraphic traps. End-phase concentrates can serve as diagnostic criteria in oil surveys assaying and following petrologic gradients toward regions of maximum development. - V. S.

269.Lahee, F. H. Exploratory Drilling in 1944. Bull. Am. Assoc. Petrol. Geol., Tulsa, Okla., vol. 29, No. 6, 1945, pp. 629-645.

This review of exploratory drilling for oil during 1944 includes ref- rences to the role of geophysical surveys. The productive and dry wild- ats in the United States, when grouped under the methods by which they were ocated, gave the following totals: (1) Geology: prod. 596, dry 2,094; 2) geophysics: prod. 146, dry 650; (3) geology and geophysics: prod. 102, ry 263; (4) sundry nontechnical: prod. 90, dry 735; (5) unknown: prod. 10. ry 110; and (6) totals: prod. 944, dry 3,852; grand total: 4,796. These igures show that 21.9 percent of the holes drilled on technical advice were roductive, as contrasted with 10.9 percent productive in the case of the oles located without such advice. (See also Geophys. Abs. 121, No. 8014). V. S.

270.Magnée, I. de. Progrès récents de la prospection géophysique et possibilites d'application au Congo Belge (Recent Advances of Geophysical Exploration and Possibilities of Application in the Belgian Congo). Ciel et Terre, Brussels, vol. 57, Nos. 9-10, 1941, 22 pp.

The nature of gravimetric, seismic, magnetic, and electrical methods s explained briefly. In Belgium the magnetic method was largely predomi- ant. Prospecting suitable for detecting minerals has possibilities in the elgian Congo. Already the Schlumberger methods have been applied to copper eposits, and magnetic and electric methods to gold deposits. It must be ecognized, however, that the geology of the Congo is not very favorable for eophysical exploration. Moreover, up to the present most prospecting has entered on superficial alluvial deposits of gold, ethane, and diamonds, for hich the applications are necessarily limited. Only certain large placers, till little known and ill-accessible to boring, would give opportunities o magnetic and electrical methods; seismic reflection is handicapped by hallowness. Thus, the best chances seem to lie in the discovery and detailed ircumsription of the numerous deep deposits, though the difficulties are onsiderable. - V. S.

271.McTee, A. R. The War's Influence on Geophysics. Oil Weekly, Houston, Tex., vol. 119, No. 2, 1945, pp. 59-60.

The scientific discoveries of the war period are generally expected o produce marked advances in geophysical exploration. To clarify these rospects the author made a survey among geophysicists, manufacturers of quipment, and operators of instruments. They anticipate some gains in echniques and apparatus, but no revolutionary changes. The radar wave engths now in use are unlikely to have sufficient penetrating power for irect application in oil prospecting. But related electronic research hould improve seismic, gravimetric, and magnetic instruments. Magnetometers uitable for airplane surveying will be constructed, and wide use of air- lanes for exploration should follow. Gravimeters will be reduced in weight; lready a 28-pound model has been announced. The Gulf Co. is perfecting an nderwater gravimeter promising expansion of under-water exploration. Geo- hermal principles also receive attention; a method of prospecting based upon ifferences in local thermal conductivity undergoes tests on the Gulf Coast. V. S.

8272. Montana Oil and Mining Journal. Wyoming Has 57 Geophysical Crews Working in Oil Areas. Great Falls, Mont., vol. 25, No. 18, 1945, p. 1.

Predictions that a new record would be set this season in geophysical exploration in Wyoming oil fields already have been vindicated by activities now underway. The prospects are bright that a new high will be reached before the end of the summer, according to a late check of major oil-company operations. A survey shows no less than 57 crews engaged in such work at the present time, including seismograph, gravity-meter, and core-drilling crews. The work extends to all parts of the State. The peak of activity will be reached late in the summer or early fall, it is believed.

8273. National Petroleum News, Cleveland, Ohio. Truman Claims Continental Shelf Oil for United States. Vol. 37, No. 40, 1945, p. 36.

A proclamation has been issured by the President of the United States to establish federal jurisdiction over the country's continental shelf beyond the 3-mile limit. The continental shelf is generally defined as land beneath the high seas contiguous to the continent and covered by water to a depth of not more than 600 feet. In the United States it ranges in width from 60 to 250 miles on the east coast, narrows south to Florida, expands considerably in the Gulf of Mexico, and falls off to its narrowest width on the west coast; the total area is 750,000 square miles. The Bureau of Mines, Geological Survey, and Land Office have investigated the geology of the shelf for more than 3 years and reported petroleum and other mineral resources under many parts; utilization is regarded already practicable with modern technology. An executive order accompanying the proclamation places the continental shelf under the administration of the Secretary of the Interior. The proclamation and the order do not affect States' rights. - V. S.

8274. Oil News. Three Geophysical Survey Crews Busy in San Juan Basin. O. N., Albuquerque, New Mexico, vol. 21, No. 6, 1945, p. 3.

Three geophysical crews are reported working in the San Juan Basin of northwestern New Mexico at this time. The Phillips Petroleum Co. has a seismograph outfit working in the Blanco sector east of the Mansfield properties. The Magnolia Petroleum Co. also is said to have a seismograph crew working in various sections of the basin. The Southern Union Production Co. is employing gravity-meter crews, who are working the gas belt from the Ute Pasture on southeast through Fulcher Basin and into the Kutz Canon areas. A number of deep explorations are scheduled for early starts in the San Juan country. It is in the deeper zones that the big pay off is most certain to be found, operators believe.

8275. Petroleum Times. Anglo-American Oil Company's Part in British Oil Search. London, vol. 49, No. 1,248, 1945, pp. 382-385, 406.

The Anglo-American Oil Co. has been engaged in oil exploration on the
itish Isles for 10 years; it has held at one time or another petroleum
ospecting licences over 4,814 square miles of territory. The history of
erations and the results of drilling are described. The exploratory methods
ployed have included geological surface and subsurface mapping and magnetic,
avimetric, seismic, and geochemical surveying, the latter in Cheshire,
ncashire, Carlisle, and much of Yorkshire and Nottinghamshire, where oil
ds are completely hidden under a thick cover of strata. The vertical
gnetic component was measured over 2,200 square miles in the eastern Mid-
nds. The static gravimeter occupied over 15,000 square miles, of which
500 were covered with stations every 1½ square miles. Seismic refraction
d reflection surveys were made, respectively, by the D'Arcy Exploration
. and a crew from the United States; further seismic surveying is planned
th the assistance of American technicians. The geochemical method was
ed over an area of 140 square miles but has been discontinued. - V. S.

276.Petroleum World. Fluorescence in Oil Exploration. Los Angeles, Calif., vol. 42, No. 7, 1945, pp. 58-59.

Fluorescence effects can be utilized in oil exploration. Petroleum
ls show a green glow under the ultraviolet light and may be identified
d located through it. The various techniques are described. In the case
test wells, the core samples, friable earth, mud, etc., must be examined
an apparatus equipped with ultraviolet light. In field prospecting, the
lected localities are searched with an ultraviolet lamp. This lamp may be
quartz-mercury arc type with short wave releasing light at 2,537 Angstroms,
a "near ultraviolet" type. A special glass filter lets through only the
visible ultraviolet rays and suppresses visible light generated by the
mp. To detect oil, the material tested must be compared with assortments
petroleum samples of known fluorescence; several techniques can be used.
rticulars of the fluoresce method will be found in J. De Ment's paper
luorochemistry in Petroleum Service". - V. S.

277.Roberts, John. Rock Disturbance in Relation to Economics and World Policy. Petroleum Times, London, vol. 49, No. 1,254, 1945, pp. 652-656.

The origin of oil is discussed with a view to advancing oil exploration.
e author's theory of metamorphic distillation holds that oil is a product
nerated by the action of frictional heat upon organic substances in moun-
in rocks. The requisite conditions are: (1) Primary deposit capable of
elding oil-producing volatiles; (2) source of heat; (3) porous-rock reser-
ir at distance sufficient for condensation of volatiles; and (4) impervious
ver preventing escape of hydrocarbons.

Accordingly, oil would be found in fractured zones where heat had been
tense at one time. The local natural pyrometers, such as the metamorphosed
cks, anthracite and marble, should indicate the former condition of a zone
d show how adequate it was for oil formation. Examples supporting this
eory are found in the oil fields of Italy, Venezuela, California, Pennsyl-
nia, Galicia, Rumania, Caucasus, and Iran; some of them are discussed
iefly. - V. S.

8278. Rust, W. M., Jr., Evaluation of New Geophysical Methods. Bull. Am. Assoc. Petrol. Geol., Tulsa, Okla., vol. 29, No. 7, 1945, pp. 865-871. Also: Geophysics, Menasha, Wis., vol. 10, No. 3, 1945, pp. 329-337.

This paper was published under a similar title in the Oil Weekly, Houston, Tex., vol. 117, No. 6, 1945, pp. 56-57, 70 (see Geophys. Abs. 121, No. 8022). - V. S.

8279. Short, E. H., Jr. Directional Drilling Used as Exploratory Tool in Gulf Coast Well. Oil Gas Jour., Tulsa, Okla., vol. 44, No. 18, 1944, pp. 111-113.

This article describes a recent application of directional drilling as a means of subsurface exploration. Although the productive horizon sought was penetrated on the second attempt, this particular case illustrates the possibilities in this type of work. - Author's abs.

8280. Tiratsoo, E. N. Future Trends in Oil Finding. Petroleum, London, vol. 8, No. 9, 1945, p. 177.

Efforts toward perfecting geophysical exploration for oil should be directed along two lines: Structural methods must be improved in range and sensitivity to detect the smallest structures, and all possible procedures must be furthered for discovering oil independently of structure. In the latter class belong geochemical, electrical resistivity, and radioactive methods. These are described briefly, with emphasis on preparatory geologica diagnosis. Further, statistics are given on the effectiveness of different methods. The successful wildcats of 1942 in central Texas, when differentiated according to methods used for locating them, constituted the following percentages of the grand total drilled in that year: (1) Random drilling, 8 percent productive; (2) surface geology, 10 percent; (3) subsurface geology, 30 percent; (4) seismograph, 36 percent; (5) geochemical, 3 percen and (6) combination of above methods, 13 percent. - V. S.

8281. Todd, J. D. Mississippi, Where Persistence Pays. Oil Weekly, Houston, Texas, vol. 118, No. 7, 1945, pp. 49-52.

A traveler's observations on the rise of gravity, seismic, and electric-logging methods in Mississippi are presented and examples of perfected approaches and techniques cited. (1) Gravity surveys have become particularl popular here after the remarkable successes of Gulf Refining work. They are now the common method of evaluating all current prospects. Experience has shown, however, that surveying must be denser; the new surveys use stations a half and even a third of a mile apart, so as to uncover all weaker anomalie (2) Seismic surveys are employed in conjunction with gravity work, in keeping with the Gulf coast practice "localize with gravimeter and check with seismograph." Good results can be obtained in most of southern Mississippi. Improved procedures have been developed for local problems. The seismograph must still be considered the best oil-finding tool, though failures are many.

) Electric logs prove very valuable for correlation, but they are insuffi-
ent for diagnosing uncored sand; only sizable cores can provide a basis
r conclusions. Every promising section should be at least sidewall-sampled.
V. S.

82.Weaver, C. E. Geology of Oregon and Washington and Its Relation to Occurrence of Oil and Gas. Bull. Am. Assoc. Petrol. Geol., Tulsa, Okla., vol. 29, No. 10, 1945, pp. 1377-1415.

The States of Oregon and Washington comprise several topographic
ovinces, each with distinctive geological features. These provinces are
scribed; attention is devoted to the crustal movements of late Miocene
d the upwarps and downfolds at the close of Pliocene. Indications of oil
ve been found in the form of very small seepages in the Tertiary formations
st of the Cascade Mountains. No conclusive evidence exists here of
mmercial amounts, but drilling tests would appear justifiable. The
tamorphic rocks, granites, lavas, and continental sediments in eastern
egon and Washington and the northern Cascade Mountains are considered
favorable for a commercial occurrence of oil. - V. S.

83.Whitcroft, T. H. Future Activities in Deep-Sea Surveying. Nat. Research Council, Am. Geophys. Union, Trans. 1944, part IV, Washington, D. C., 1945, pp. 610-613.

The author discusses the principal problems facing exploration of ocean
sins: (1) Obtaining the necessary soundings; (2) evolving a more uniform
thod of correlating and publishing them on an international basis; and
) agreeing upon a more suitable means for graphically representing these
undings. - V. S.

84.Zanetta, A. J. La investigación y la industria petrolífera (Research and the Petroleum Industry). Bol. de Min. y Petrol., Mexico, vol. 16, No. 6, 1945, pp. 32-34.

An abridged version of the paper published in Boletin de Informaciones
troleras, Buenos Aires, vol. 21, No. 241, 1944, pp. 11-30 (see Geophys.
s. 121, No. 8025).

85.Zirbel, N. N. A Method of Determining Dip, Strike, and Impact Point for Steeply Dipping Beds. (abs.) Geophysics, Menasha, Wis., vol. 10, No. 3, 1945, p. 455.

A method of determining the dip, strike, and impact point for steeply
pping beds which is considered simple enough for use in normal field
mputation is described.

10. PATENTS

8286. Method and Apparatus for Dynamic Measurement of Borehole Radioactivity. Shelley Krasnow, New York, N. Y. U.S. Patent 2,371,628, issued March 20, 1945.

In an apparatus for obtaining information concerning conditions within a bore hole, means insertable within the bore hole, and responsive to radioactive rays originating within the bore hole, means to measure the time derivative of response of the first-named means, means at the surface of the earth to record the said time derivative, and means to indicate the position of the first-named means, the said indicated time derivative and indicated position serving to enable the correlation between radioactive properties and position within the borehole. - Claims allowed, 24.

8287. Method of Prospecting for Buried Deposits. Eugene McDermott, Dallas, Tex. U.S. Patent 2,371,637, issued March 20, 1945.

In the art of exploring for buried oil or gas deposits from which leakage occurs, the method of prospecting for the location of such deposits, which comprises taking a soil sample from each of a plurality of points spaced a predetermined distance apart over a predetermined area of the earth's surface at depths depending upon local conditions and sufficient to obtain soil not materially affected by excessive drainage, weathering, or leaching, heating the samples, substantially free from vegetable-matter carbon and containing other less readily combustible carbon matter found in said soil, in the presence of oxidizing gas containing free oxygen, and converting to carbon dioxide by the resulting combustion substantially only, said less readily combustible carbon matter in a measurable quantity in a sample, and determining substantially only carbon so converted, whereby valuable information is obtained concerning the location of said buried oil or gas deposits. - Claims allowed, 11.

8288. Method and Apparatus for Determining Current Flow in Borehole Casing or the Like. W. H. Stewart, Beaumont, Tex., assignor to Sun Oil Co., Philadelphia, Pa., a corporation of New Jersey. U.S. Patent 2,371,658, issued March 20, 1945.

The method of determining the flow to and from a casing located in a bore hole of earth currents due to galvanic action or sources remote from the casing, comprising lowering into the casing means for producing a flow of current along the casing between spaced points in the interior of the casing from an artificial current source, while the only other sources of current flow in the casing are those causing said earth currents of galvanic or remote origin, adjusting said source to attain a condition of no current flow between said spaced points, and determining the current introduced from said source when said condition is attained. - Claims allowed, 3.

289. Geophysical Prospecting Apparatus. J. P. Minton, Dallas, Tex., assignor, by mesne assignments, to Socony-Vacuum Oil Co., Inc., New York, N. Y., a corporation of New York. U.S. Patent 2,371,973, issued March 20, 1945.

A device for detecting seismic waves, comprising an armature formed of
plurality of laminations of a material having high magnetic permeability
nd low residual magnetism, a rigid frame having spaced portions, means for
igidly securing opposite ends of said armature to said spaced portions with
aid armature disposed in a horizontal position and movable vertically by
pplication of seismic waves to said frame, an inertia assembly including
pair of E-shaped cores formed of a plurality of laminations of a material
aving high permeability and low residual magnetism, said assembly including
pring means supporting one of said cores on the upper side of said armature
nd the other of said cores on the lower side of said armature with very
arrow air gaps between each leg of each core and said armature and with the
aminations thereof parallel to those of said armature, said spring means
aving characteristics such as to eliminate movement of said cores upon
pplication of said seismic waves to said frame, said assembly including a
oil encircling each of said cores, said narrow air gaps being of the order
f ten thousandths of an inch for producing operation on the steeper slope
f the characteristic curve between inductance and air gap, so that upon
elatively minute movements between said cores and said armature produced by
aid seismic waves there occurs a substantial change in inductance of one
oil in one direction and simultaneously a substantial change of inductance
n the other coil in the opposite direction, said armature and said cores
roviding for bodily vertical movement by said seismic waves of said armature
imultaneously and substantially uniformly to change the air gaps between the
aid legs of each of said cores and said armature. - Claims allowed, 1.

290. Method and Apparatus for Recording Seismic Waves. R. A. Broding, Dallas, Tex., assignor to Socony-Vacuum Oil Co., Inc., New York, N. Y., a corporation of New York. U.S. Patent 2,372,056, issued March 20, 1945.

A method of detecting and recording seismic waves that comprises generat-
ng an electrical carrier current wave of a frequency higher than that of
he seismic waves to be detected, modulating said carrier wave in accordance
ith said seismic waves by varying the tuned resonance of two circuits such
hat one circuit approaches resonance while the other departs farther from
t, rectifying the voltages induced in the two circuits by half-wave recti-
iers which pass different half waves in the two circuits, adding algebrai-
ally the two rectified voltages, eliminating the carrier wave, and ampli-
ying and recording the resultant signal. - Claims allowed, 9.

291. Pivot for Gravity Meters. D. H. Clewell, Dallas, Tex., assignor, by mesne assignments, to Socony-Vacuum Oil Co., Inc., New York, N. Y., a corporation of New York. U.S. Patent 2,372,252, issued March 27, 1945.

In a gravity meter having a housing, a mass structure disposed within the housing, pivoting means for mounting the mass structure for rotation in a vertical plane, elastic means for balancing the gravity moment of the mass structure, a support for the pivoting means, said pivoting means comprising a relatively heavy leaf spring secured at its midpoint to the support, a pair of light leaf springs disposed in parallel relationship to each other and having an end of each secured to opposite ends of the relatively heavy leaf spring, clamping means carried by the mass structure adapted to receive the free ends of the light leaf springs to effect a frictionless pivot for the mass structure, whereby excessive stresses imparted to the light leaf springs will in part be absorbed by the relatively heavy leaf spring. - Claims allowed, 3.

8292. Analytical System. D. D. Taylor, Altadena, Calif., assignor to Consolidated Engineering Corp., Pasadena, Calif., a corporation of California. U. S. Patent 2,373,151, issued April 10, 1945.

In analyzing a mixture containing a plurality of components with respect to one component, the method which comprises ionizing a sample of said mixture at such a predetermined ionization voltage that ions of a selected mass-to-charge ratio which may be formed from each of said components at some ionization voltage are actually formed from only said one component, ionizing at the same voltage a reference sample containing a known amount of said one component, measuring the amounts of said ions formed from both said samples, and determining from said measurements the quantity of said one component present in the mixture. - Claims allowed, 4.

8293. Automatic Volume Control Circuit. F. J. Faltico, Minneapolis, Minn., assignor to The Maico Co., Inc., Minneapolis, Minn. U. S. Patent 2,373,180, issued April 10, 1945.

In a multiple-stage electronic amplifier system in which one stage preceding the final stage employs an electronic amplifier having, in addition to the usual cathode, plate, and control grid, another grid, which when electrically charged will modify the flow of electrons from said cathode to said plate, the said other grid of said preceding stage amplifier being connected as an anode in an output circuit that is connected to the input circuit of the succeeding stage in the manner usually assigned to a plate, and having impressed thereon a positive D. C. potential of predetermined value, whereby the said electronic amplifier of the preceding stage and the amplifier system as an entirety will function normally, except for automatic volume control action, independently of the plate of said preceding stage amplifier, means feeding back signal voltage from the output of a succeeding stage to the plate of said electronic amplifier of the preceding stage, whereby rectification will take place between the plate and cathode of said preceding stage amplifier when, but only when, peak values of positive signal voltage exceed the positive D. C. potential impressed upon the said other grid of the preceding stage amplifier, and means for applying a predetermined percentage of the negative D. C. voltage available at the said plate as a result of rectification to the control grid of an electronic amplifier of the said system to serve as a volume suppressing bias. - Claims allowed, 21.

94. Signal Recording and Reproducing Method. G. C. Sziklai, Bloomington, Ind., assignor to Radio Corporation of America, a corporation of Delaware. U. S. Patent 2,373,273, issued April 10, 1945.

The method of recording signals, which comprises subjecting successive rtions of an electro-conductive material to the action of a second material, ich is adapted to react therewith chemically under the influence of an ectrical potential to form a dielectric coating thereon while applying ereto a varying potential representative of said signals whereby to form said first-named material a dielectric coating of varying thickness presentative of said signals. - Claims allowed, 8.

295. Method and Apparatus for Moisture Measurement of Materials. Hyman Olken, Washington, D. C. U. S. Patent 2,373,846, issued April 17, 1945.

Means for measuring the conductivity of a material comprising a con-ainer having one side as a shearing plate, a plurality of electrodes forming ondenser plates positioned on the external face of said shearing plate, nd a measuring circuit for measuring the apparent capacity of the condenser o formed, means providing said condenser with dimensional values and nsulating the electrodes thereof, whereby the conductivity and capacity ave a straight-line relationship with each other. - Claims allowed, 4.

296. Surveying Instrument. Leo Ranney, McConnelsville, Ohio. U. S. Patent 2,373,976, issued April 17, 1945.

A surveying apparatus for apertures such as oil and gas wells, com-rising an elongated casing adapted to be introduced into such an aperture n alignment therewith and having a liquid delivery passage extending ongitudinally therethrough, a removable container located within said asing in a fixed position with relation thereto, a self-adjusting direction-ndicating device located in said container, a pressure-responsive piston ocated within said passage and movable in response to pressure applied hereto, a fluid pressure-responsive element located within said container or locking said device in a fixed position, and a plunger actuated by said iston to increase the fluid pressure within said container and thereby ctuate said element to lock said device against motion relatively to said ontainer. - Claims allowed, 10.

297. Geochemical Surveying. E. E. Roper, Tulsa, Okla., assignor to Stanolind Oil & Gas Co., Tulsa, Okla., a corporation of Delaware. U.S. Patent 2,374,135, issued April 17, 1945.

Apparatus for geochemical surveying comprising a molecular still for esorbing hydrocarbons from a soil sample, at least one trap connected to aid molecular still for trapping hydrocarbons desorbed from said soil ample, means connected with said molecular still and with said trap for evacuating said molecular still and said trap, a sample reservoir for light hydrocarbons, said sample reservoir being connected with said trap, means for passing a hydrocarbon-free gas through said trap and into said reservoir to transfer hydrocarbons from said trap to said reservoir, an additional trap alternatively connected with said molecular still, means connected with said additional trap and with said molecular still for further evacuating said molecular still and similarly evacuating said additional trap, a second sample reservoir for heavy hydrocarbons, and means connected with said additional trap and with said second sample reservoir for passing a hydrocarbon-free gas through said additional trap and into said second sample reservoir. - Claims allowed, 5.

8298. Borehole Logging Method and Apparatus. D. G. C. Hare, New York, N. Y., assignor to Texaco Development Corp., New York, N. Y., a corporation of Delaware. U.S. Patent 2,374,197, issued April 24, 1945.

The method of forming a well hole which comprises operating a cutting tool so as to penetrate the earth formations, simultaneously measuring the natural radiation of the formation in the immediate vicinity of the cutting tool as the hole is formed, said radiation reaching the hole from all directions in planes intersecting that portion of the well hole in said vicinity, and correlating variations in radioactivity detected with the depth of the cutting tool in the hole. - Claims allowed, 7.

8299. Apparatus for Recording Seismic Waves. Herbert Hoover, Jr., Sierra Madre, Calif., assignor, by mesne assignments, to United Geophysical Co., Pasadena, Calif., a corporation of California. U.S. Patent 2,374,204, issued April 24, 1945.

An apparatus for seismic prospecting, a seismic wave receptor adapted to convert into electric waves a seismic wave train, an amplifier connected to the receptor and including a grid-type gain-control element, and gain-control means connected to said element to vary the gain of the amplifier as a function of two independent electrical parameters, the constants of the gain-control means being coordinated to vary one of the parameters solely as a predetermined function of the time elapsing since the reception of the first portion of the wave train, and to independently and simultaneously vary the other parameter as a function of signal strength of said amplifier. - Claims allowed, 7.

8300. Geochemical Prospecting System. H. E. Metcalf, San Francisco, Calif., assignor, by mesne assignments, to Consolidated Engineering Corp., Pasadena, Calif., a corporation of California. U.S. Patent 2,374,227, issued April 24, 1945.

In the art of geochemical prospecting wherein a plurality of earth-content samples are systematically taken over an area to be prospected, each sample enclosed in an individual container, and the samples subsequently alyzed for constituents which are related to gases which normally migrate ward from a mineral deposit below the sampling points, the improvement, ich comprises exhausting each container, placing such exhausted container a substantial depth below the surface of the earth without substantial sturbance or aeration of said soil, and wherein such soil has not been eviously disturbed at any substantially near locality, by means of a tool ving provision for accommodating the container as well as means operable om the earth's surface for breaking the seal and resealing the container d adapted to be driven into the soil, the container while accommodated in id tool having communication with the exterior thereof, opening the hausted container to aspirate fluid into said container from the soil rrounding said container only, resealing said container, and withdrawing e tool with the container to the surface, whereby the contained sample gether with others of the said plurality may be analyzed to obtain data eful in locating said deposit. - Claims allowed, 3.

01.Oil Well Testing Device. C. V. Millikan, Tulsa, Okla., assignor to Geophysical Research Corp., New York, N. Y., a corporation of New Jersey. U.S. Patent 2,374,557, issued April 24, 1945.

Apparatus of the character described, comprising a chamber having inlet id outlet ports, a check valve for said inlet port, an outlet port lift alve movable to closed position in the direction of fluid flow through said itlet port, biasing means tending to close said lift valve, a nonrotatable lidable member operable in one position to hold open said lift valve, a nslidable rotating member, and interengageable means on said rotatable and lidable members for maintaining the latter in position to hold open said ift valve, said means being disengaged in one position of said rotatable ember relative to said slidable member to permit said lift valve to close, id means for driving said rotatable member. - Claims allowed, 8.

302.Geochemical Well-Logging. Leo Horvitz, Houston, Tex., assignor to E. E. Rosaire, Houston, Tex. U.S. Patent 2,374,937, issued May 1, 1945.

A method of logging a borehole which comprises collecting samples of oil at spaced intervals along the borehole, analyzing each sample for its ntent per unit weight of at least one substance selected from the group nsisting of ionizable inorganic salts and the component ions thereof, the ubstance selected being the same for all samples, and correlating the ncentrations of said substance so determined in the respective samples with he depths from which the samples were taken, the samples collected being ufficient in number to yield data showing the variation in concentration f the selected substance with depth, whereby such correlation may be interreted to predict the possible approach of the borehole to a petroleum eposit. - Claims allowed, 11.

303.Amplification Control in Seismic Surveying. R. T. Cloud, Los Angeles, Calif., assignor, by mesne assignments, to Stanolind Oil & Gas Co., Tulsa, Okla., a corporation of Delaware. U.S. Patent 2,375,283, issued May 8, 1945.

A device for geophysical prospecting that comprises means to create seismic waves in the earth, means to detect said waves and translate them into electrical vibrations, means to amplify said electrical vibrations, including at least one thermionic tube amplifier containing a plurality of tubes, means to vary the biasing potential on the grid of at least two tubes operating out of phase in said amplifier so as to control the degree of amplification of said vibrations without disturbing the base line thereof, and means to record said amplified vibrations. - Claims allowed, 8.

8304. Seismograph. J. P. Minton, Dallas, Tex., assignor, by mesne assignments, to Socony-Vacuum Oil Co., Inc., New York, N. Y., a corporation of New York. U.S. Patent 2,375,433, issued May 8, 1945.

In a timing system for electric seismographs having a record sheet and driving means therefor, the combination of a timing device for placing transverse parallel lines as indications of elapsed time on said record sheet comprising a base, a thin elastic plate having one end secured to said base and the opposite end free to vibrate a shutter carried by said free end of said reed, an electromagnet for moving said free end of said reed to an angular position to store energy therein, an energizing circuit for said electromagnet, and common means for starting said driving means and in quick succession closing and opening said energizing circuit to initiate vibration of said reed upon starting of said driving means. - Claims allowed, 3.

8305. Seismic Detector System. Eugene McDermott, Dallas, Tex., assignor to Geophysical Service Inc., Dallas, Tex. U.S. Patent 2,375,570, issued May 8, 1945.

Apparatus for seismic surveying, comprising a plurality of spaced seismometers for converting seismic waves into electrical waves, a plurality of channels for transmitting these electrical waves to a recorder, and a recorder arranged to record the waves from the respective channels on a single record for comparison, each of said channels including an amplification stage and an attenuation device, said attenuation devices each comprising a variable resistance for reducing the strength of the high-energy waves and means for varying said resistances in unison with each other to effect a reduction in attenuation as the incoming signals become weaker. - Claims allowed, 1.

8306. Electrical Prospecting System. H. M. Evjen, Houston, Tex., assignor to Nordel Corp., Houston, Tex., a corporation of Delaware. U.S. Patent 2,375,775, issued May 15, 1945.

A system for electrical prospecting comprising an earth current circuit, including a source of direct current, a pair of spaced earth electrodes, and a reversing switch connected between said source and said electrodes for reversing the earth current at a plurality of different predetermined controlled frequencies, a potential circuit including potential pick-up

ectrodes located at spaced points lying within the field of influence of
id earth current, an indicating device responsive to unidirectional poten-
al connected to indicate the potential impressed on said potential circuit,
d a reversing switch synchronized with said first reversing switch and
nnected in said potential circuit between said pick-up electrodes and said
dicating device for converting the picked-up potential into a unidirectional
tential suited to actuate said indicating device, a source of potential
nnected to introduce into said potential circuit a measuring potential
posing said picked-up potential, means for adjusting said measuring poten-
al to obtain a null balance on said indicating device, and a compensating
rcuit interconnecting said earth-current circuit and said potential circuit,
id compensating circuit having an input side connected to be energized by
rrent flow in said earth-current circuit on the earth electrode side of
id first reversing switch and including a filter network having an output
de connected in said potential circuit, said filter network having charac-
eristics such that its output potential varies with frequency in a manner
compensate for variations in picked-up potential due to normal changes of
e earth current circuit with frequency and being so arranged that the
adings of the adjustments of said adjusting means obtained at different
rth current frequencies approximate a horizontal curve with ripples desig-
ating significant variations in the earth's strata. - Claims allowed, 7.

07. Electrical Prospecting System. H. M. Evjen, Houston, Tex., assignor
to Nordel Corp., Houston, Tex., a corporation of Delaware. U.S. Patent
2,375,776, issued May 15, 1945.

A system for electrical prospecting comprising an earth-current circuit
cluding spaced earth-current electrodes, means supplying to said electrodes
r passage through the earth a current in the form of a series of similar
lses, successive pulses being in opposite directions and being spaced by
gap period during which no current flows, said gap periods and said pulse
eriods together forming a repeated pattern of controlled frequency, probe
ectrodes in the earth within the field of influence of said earth current,
potential measuring circuit connected to said probe electrodes including
D. C. potential measuring instrument, and a reversing switch timed to
ose said measuring circuit only during current gap periods and to convert
e picked-up potential into a unidirectional potential suited to actuate
id measuring instrument. - Claims allowed, 7.

08. Electrical Prospecting System. H. M. Evjen, Houston, Tex., assignor
to Nordel Corp., Houston, Tex., a corporation of Delaware. U.S. Patent
2,375,777, issued May 15, 1945.

A system for electrical prospecting comprising an earth-current circuit
cluding a source of direct current, spaced earth-current electrodes and
nnections supplying current from said source to said electrodes for passing
current through the earth, means in said circuit to interrupt and reverse
id current at a controlled low frequency with controlled current gap
eriods at each interruption during which no current flows, a potential

circuit including potential pick-up electrodes located at spaced points within the field of influence of said earth current, and a measuring circuit connected to said pick-up electrodes, said measuring circuit comprising a D. C. potential measuring instrument, interrupting and reversing means timed with said first interrupting and reversing means to connect said measuring instrument across said pick-up electrodes only during current gap periods and to reverse the connections to said measuring instrument at successive current gap periods to rectify the picked-up potential induced by said earth current, a potential responsive circuit, means timed with said first interrupting means to connect said last circuit to said pick-up electrodes during successive earth current flow periods, means in said last circuit to derive a potential proportional to the potential picked up during said successive earth current periods, and means timed with said second interrupting and reversing means to apply said derived potential to said measuring instrument in a direction and at a time to oppose the picked-up potential applied thereto from said pick-up electrodes during said current gap periods to afford thereby a highly sensitive indication of their relative values. - Claims allowed, 5.

8309. Apparatus for Making Geophysical Exploration. H. M. Evjen, Houston, Tex., assignor to Nordel Corp., Houston, Tex., a corporation of Delaware. U. S. Patent 2,375,778, issued May 15, 1945.

The method of electrical prospecting which comprises passing through the earth a current from a direct current source, periodically interrupting and reversing said current at a controlled low frequency with predetermined current gap intervals at each interruption, picking up the potential between spaced points within the field of influence of said earth current during the current gap intervals, passing a second current from a direct current source through the earth during each current gap interval in a direction to oppose the picked-up potential, regulating said second direct current to exactly balance out the picked-up potential and measuring the ratio between said first and second direct currents when said balance is obtained. - Claims allowed, 12.

8310. Thermometer. George Bouyoucos, East Lansing, Mich., assignor to Michigan State Board of Agriculture, East Lansing, Mich., a corporation of Michigan. U. S. Patent 2,375,892, issued May 15, 1945.

An electrical resistance thermometer comprising an electrically nonconductive heat-conducting container, an electrically conductive nonelectrolytic liquid in said container adapted to vary in electrical conductivity in accordance with variations in the temperature thereof, and a pair of spaced-apart electrodes having portions thereof within said container, the said portions of the electrodes being wholly immersed in said liquid and adapted to constitute a portion of means for passing a current of electricity through said liquid. - Claims allowed, 5.

311.Geochemical Prospecting. R. T. Sanderson, Fishkill, N. Y., assignor to Stanolind Oil & Gas Co., Tulsa, Okla., a corporation of Delaware. U.S. Patent 2,375,949, issued May 15, 1945.

A method of geochemical prospecting comprising removing soil gases from oil, trapping condensable hydrocarbons therefrom, conveying said trapped ydrocarbons to a hydrocarbon measurement zone in a sample of oxygen-conaining gas, and comparing the amounts of hydrocarbons in said sample of as and in a second sample of gas from the same source but free of said rapped hydrocarbons. - Claims allowed, 12.

312.Gas Analysis. Leo Horvitz, Houston, Tex. U. S. Patent 2,376,145, issued May 15, 1945.

In an apparatus for analyzing gases for their content of combustible onstituents present therein in minute amounts, in combination, means for pearating and isolating from said gas said combustible constituents, means orming with said first-mentioned means a closed circulating system including gas collection receptacle and said pump, a combustion chamber in said econd circulating system, a refrigerating zone in said second circulating ystem, and means for introducing a combustion-supporting gas into said econd circulating system. - Claims allowed, 1.

313.Well Logging. W. D. Mounce, Houston, Tex., assignor to Standard Oil Development Co., a corporation of Delaware. U.S. Patent 2,376,168, issued May 15, 1945.

An apparatus for logging a well, comprising an electrode carrier having t least three spaced electrodes, a source of alternating current, a conductor or connecting said source to only one of said electrodes, a second conductor onnecting two other electrodes, whereby an alternating current is set up n said second conductor due to A. C. potential differences between said onnected electrodes, means carried by said electrode carrier and electrically onnected to said first conductor for converting said alternating current o a D. C. potential, and means electrically connected to said first conductor t the surface for measuring said D. C. potential. - Claims allowed, 25.

314.Amplifying Apparatus. S. A. Scherbatskoy, Tulsa, Okla., assignor to Engineering Laboratories, Inc., Tulsa, Okla., a corporation of Oklahoma. U. S. Patent 2,376,195, issued May 15, 1945.

A device for geophysical prospecting that comprises means to create eismic waves in the earth, means to detect said waves and translate them nto electrical vibrations, means to amplify said electrical vibrations, ncluding at least one thermionic tube amplifier containing a plurality of ubes, means to vary the biasing potential on the grid of at least two tubes perating out of phase but in cascade in said amplifier so as to control the egree of amplification of said vibrations without disturbing the base line hereof, and means to record said amplified vibrations. - Claims allowed, 1.

8315. Ionization Chamber. S. A. Scherbatskoy, Tulsa, Okla., assignor to Well Surveys, Inc., Tulsa, Okla., a corporation of Delaware. U.S. Paten 2,376,196, issued May 15, 1945.

An ionization chamber adapted for use in detecting radiations caused by nuclear disintegrations that comprises a housing, an ionizable medium in said housing, a coat of insulating varnish carried by the inner wall of said housing, at least two electrodes disposed within said housing in the ionizabl medium, one of said electrodes being a conductive paint that is applied to the inner surface of the insulating varnish that is carried by the inner wall of the housing, and conductors leading from the electrodes to a point outside of the housing for electrical connection to said electrodes. - Claims allowed, 10.

8316. Photoelectric Recording System. R. L. Hood, Stamford, Conn., assignor to American Cyanamid Co., New York, N. Y., a corporation of Maine. U. S. Patent 2,376,311, issued May 15, 1945.

A device for recording a function of the temperature differential between two temperature responsive devices including in combination, means for converting changes in temperature differential into proportional changes in direction of two beams of visible light, means for converting the directional changes in the light beams into proportional changes in electrical energy and means for progressively recording a function of the changes in electrical energy. - Claims allowed, 9.

8317. Geochemical Prospecting System. R. C. Lawlor, Pasadena, and H. E. Metcalf, San Francisco, Calif., assignors, by direct and mesne assignments, to Consolidated Engineering Corp., Pasadena, Calif., a corporation of California. U.S. Patent 2,376,366, issued May 22, 1945.

The method of geochemical prospecting that comprises placing an unsealed container at a substantial depth below the surface of the earth, without substantial disturbance of the earth near the container, by a tool having provision for accommodating the container and also for exhausting air from the container and subsequently sealing it, both from the earth's surface, thereby exposing the interior of the container to the surrounding soil, exhausting the air in the container to the earth's surface to aspirate liquids and gases from the soil into the container, then sealing the containe by operation of said tool, then removing the tool and container to a position above the surface and then removing the aspirated liquids and gases from the container. - Claims allowed, 2.

8318. Electrical Prospecting Method and Apparatus. J. W. Millington, Beaumont, Tex., assignor to Sperry-Sun Well Surveying Co., Philadelphia, Pa., a corporation of Delaware. U.S. Patent 2,376,610, issued May 22, 1945.

The method of determining the location and character of formations netrated by a borehole comprising providing, in formations penetrated the borehole, a signal current wave having oscillations varying in both requency and amplitude due to changes in said formations along the hole, d separately determining visibly and quantitatively and in the same run id frequency and amplitude variations of the oscillations of said current ve. - Claims allowed, 5.

319. Apparatus For Detecting Underground Metallic Objects. H. Chireix, Paris, France; vested in the Alien Property Custodian. U. S. Patent 2,376,659, issued May 22, 1945.

In apparatus for the detection of metallic objects, the combination f an oscillation generator, means to stabilize the frequency of said enerator, a tuned circuit excited by said generator and including a search op which is adapted to be positioned in the zone where metallic objects re to be detected, a bridge circuit having four legs which form, in an lectrical sense, a square with two diagonals, circuit means impressing the oltage of said tuned circuit across one diagonal of said bridge and the oltage of said generator across the other diagonal of said bridge, said ridge being effective when said tuned circuit is in resonance to produce balance of voltages, and means to produce a signal in response to an nbalance of voltages caused by the presence of a metallic object adjacent aid loop. - Claims allowed, 3.

320. Apparatus For Sonic Detection. J. R. Steinhoff, Washington, D. C. U. S. Patent 2,376,730, issued May 22, 1945.

In a sonic direction-finding device, four directionally responsive icrophones divergently directed at an angle of 90°, one to the other in a orizontal plane, a direction indicator responsive to signals from said icrophones, means for impressing signals from each of said microphones pon said indicator in a sense directionally oriented in correspondence with he direction of said microphones, a further microphone positioned to receive ubstantially only station noise, and means for reducing the signals from ach of said first microphones in proportion to the strength of the signal rom said further microphone. - Claims allowed, 7.

321. Well Logging Instrument. S. A. Scherbatskoy, R. E. Fearon, and Jacob Neufeld, Tulsa, Okla., and Gilbert Swift, Red Bank, N. J., assignors to Well Surveys, Inc., Tulsa, Okla., a corporation of Delaware. U.S. Patent 2,376,821, issued May 22, 1945.

In an apparatus for well surveying, a measuring instrument for lowering nto a drill hole, which comprises an elongated tubular case sealed against he entrance of well fluids and comprised of at least two sections threaded gether, the lower section of which forms the outer walls of an ionization chamber, and the upper section of which houses apparatus for measuring the flow of current in the ionization chamber and sending signals indicative of the resultant measurements to the surface of the earth, said measuring apparatus being constructed as a unit adapted to slip into the outer casing and be connected to the ionization chamber by a socket and plug connection and being comprised of two sub-units, one containing the measuring circuit and the other containing a power source for operation of the measuring circuit, the unit containing the power source being adapted to slip into one end of the unit containing the measuring circuit and be attached thereto by a plug and socket connection. - Claims allowed, 5.

8322. Method of Determining the Permeability of Earth Formations. P. J. Lehnhard, Jr., Houston, Tex., assignor to The Dow Chemical Co., Midland, Mich., a corporation of Michigan. U.S. Patent 2,376,878, issued May 29, 1945.

In a method of determining the permeability of a formation penetrated by the bore of a well, the steps which comprise introducing two immiscible fluids into the well bore, one being of higher specific gravity and electrical conductivity than the other, so as to form two layers of fluid in the well bore, ascertaining the position of one of the fluids in the well bore, maintaining one of said fluids adjacent the portion of the formation the permeability of which is to be tested, by controlling the rate of introduction of said fluids into the well bore and forcing the fluid adjacent the section of the formation to be tested into that portion of the formation at a known rate and under a known pressure, whereby said known rate gives an indication of the permeability of that portion of the formation. - Claims allowed, 2.

8323. Dynamic Earth Inductor Compass. A. S. Riggs, Chicago, Ill., and H. H. Thompson, Mountain Lakes, N. J., assignors to Sperry Gyroscope Co., Inc., Brooklyn, N. Y., a corporation of New York. U. S. Patent 2,376,883, issued May 29, 1945.

In an earth inductor compass, a conducting loop mounted for oscillation about a vertical axis in the plane of the loop, resilient restraining means limiting the amplitude of oscillation, means producing oscillation about said axis including a coil having a substantially horizontal magnetic axis for producing flux interacting with the flux of said loop, a source of alternating current, and a source of direct current, one of said sources being connected to said loop and the other to said coil, and connected means for indicating the potential generated in said loop when oscillating in the earth's magnetic field. - Claims allowed, 12.

8324. Geochemical Prospecting. Bela Hubbard, Mount Vernon, N. Y., assignor to Standard Oil Development Co., a corporation of Delaware. U.S. Patent 2,377,082, issued May 29, 1945.

A method for determining if the wax in a wax-containing material is of etroleum origin, which comprises extracting said material with a solvent or said wax, slowly evaporating the solvent from the extract to promote the rowth of orthorhombic crystals, and maintaining the crystals formed under onditions such as to preserve the platelike structure, characteristic of ax of petroleum origin, of said crystals. Claims allowed, 3.

325. Accelerometer. R. B. Cottrell, Chicago, Ill., assignor to American Steel Foundries, Chicago, Ill., a corporation of New Jersey. U. S. Patent 2,377,212, issued May 29, 1945.

A device including a frame, a mass supported from said frame and elatively movable with respect thereto, a tension strap connected to said ass and said frame, and means for indicating changes in the tension of aid strap. – Claims allowed, 6.

326. System for Geological Exploration by Elastic Waves. Frank Rieber, Los Angeles, Calif., assignor, by direct and mesne assignments, to Continental Oil Co., Ponca City, Okla., a corporation of Delaware. U.S. Patent 2,377,903, issued June 12, 1945.

An apparatus for recording decaying transients comprising a detector, n amplifier adapted to amplify the impulses from said detector, a recorder onnected to said amplifier for recording the impulses from the amplifier, eans for varying the recorder response substantially inversely to the mplitude of the decaying transient to be recorded in a way to effect recording of the waves of smaller magnitude with sufficient magnitude to permit heir form to be studied. – Claims allowed, 13.

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Fisch, W. Geophysical investigation of a coal outcrop in Switzerland (in German)	120	(4)	7849
Fleming, J. A. Summary of the years work to June 30, 1944, Dept. of Terrestrial Magnetism, Carnegie Inst. of Washington	120	(2)	7804
______ List of geomagnetic observatories VI - VII (with Scott, W. E.)	120	(2)	7805
______ Researches in terrestrial magnetism and electricity at Department of Terrestrial Magnetism, during April 1943 to May 1944	122	(2)	8070
Folk, S. H. Developments in the application of geophysics to ground-water problems (with Bays, C. A.)	120	(8)	7878
______ Geophysical logging of water wells in northeastern Illinois (with Bays, C. A.)	121	(8)	8011
Frenkel, Ia. I. Regarding the theory of seismic and seismo-electrical phenomena in humid ground (in Russian)	123	(3)	8226
Fritsch, Volker. Some radio-geological investigations carried out in the year 1939 (in Italian)	120	(4)	7850

	Abs.	Class	No.
______ Radio prospecting (spark prospecting) (in German)	120	(4)	7851
______ Notes on the investigation of geoelectrical lightning hazards	121	(4)	7989
______ Note on the work done in 1941 at the lightning test field of Absroth	121	(4)	7990
______ New measuring instruments for radio prospecting (in German)	122	(4)	8114
______ Investigation of the divining rod phenomenon (in German)	122	(8)	8140
______ Methods of measurements in radio prospecting (in German)	123	(4)	8247
Frosch, Alex. Well-logging, U. S. Patent 2,369,550	122	(10)	8177
Fu, C. Y. On the origin and energy of oscillatory earthquake waves	121	(3)	7969

G

	Abs.	Class	No.
Gabriel, V. G. Electrical resistivity methods of exploration	120	(4)	7852
______ Application of electric transient method of oil exploration	121	(4)	7991
______ Mathematical chance of finding oil	122	(8)	8141
Gaby, P. P. A new type of seismic cross-section wherein accuracy of representation is rendered insensitive to velocity error	122	(3)	8090
Galbraith, F. M. The magnetometer as a geological instrument at Sudbury	120	(2)	7806
Gamburtsev, G. A. On a mode of areal seismic prospecting by the correlation refraction method	121	(3)	7970
______ Incomplete systems of hodographs of refracted waves (in Russian)	122	(3)	8091
Gassmann, Fritz. Magnetic measurements of Alpine ore deposits (in German)	122	(2)	8071
______ An electrical seismograph with registration at distance (in German)	122	(3)	8092
Gebhardt, R. E. The seismological installation at the South Dakota State School of Mines and Technology, Rapid City, South Dakota, (with McComb, H. E. and Wark, D.)	123	(3)	8234
Gemert, A. G. M. van. Measurements on self-quenching Geiger-Mueller counters, I - II (with Hartog, H. and Muller, F. A.)	121	(5)	7998
Gerling, E. K. Age of the earth according to radioactivity data	120	(5)	7863
Gilmore, M. H. Ground vibrations (with Carder, D. S.)	121	(3)	7966
Gish, O. H. A curious effect in an ionization meter	122	(5)	8121
Gotsman, B. The determination of the horizontal component of the earth's magnetic force at the magnetic observatory, Hermanus, Un. So. Africa (with Ogg, A. and Wijk, A. M.)	122	(2)	8079

	Abs.	Class	No.
Goudey, Raoul. Measurements of the intensity of gravity in Grance during the year 1941, 2nd series (in French)........	120	(1)	7789
Graf, Anton. A new small gravimeter (in German)..........	120	(1)	7790
______ Gravity meter, U. S. Patent 2,351,955.............	120	(10)	7910
Green, W. G. Seismic prospecting, U. S. Patent 2,364,209.	121	(10)	8045
Gregersen, A. A. Exploratory activity and oil and gas discoveries in California - 1944..................	120	(8)	7882
Grenet, Gaston. On the regularity of the clock movements designed to activate seismograph recorders (in French)	123	(3)	8227
Gross, H. E. Marine petroleum possibilities.............	123	(8)	8264
Grossi, Mario. Geological and geophysical considerations regarding deposits of methane (in Italian)...........	123	(8)	8265
Grosskopf, J. The radiation field of a vertical dipole sender over a stratified ground (in German)...........	120	(4)	7853
Gunn, Ross. The mechanics of the lithosphere and its relation to gravity anomalies and fracture...........	122	(1)	8059
Gunter, Herman. Florida geology and petroleum............	122	(8)	8142
Gutenberg, Beno. Reflected and minor phases in records of nearby earthquakes in southern California.........	120	(3)	7826
______ Frequency of earthquakes in California (with Richter, C. F.)...................................	120	(3)	7827
______ Recent results of earthquake study in southern California (with Richter, C. F.).....................	120	(3)	7828
______ Amplitudes of surface waves and magnitudes of shallow earthquakes..............................	121	(3)	7971
______ Amplitudes of P, PP, and S and magnitude of shallow earthquakes..............................	122	(3)	8093
______ Variations in physical properties within the earth's crustal layers............................	122	(3)	8094
______ Magnitude determination for deep-focus earthquakes..	123	(3)	8228
______ Seismicity of the earth (Supplementary paper) (with Richter, C. F.)................................	123	(1,3)	8229

H

	Abs.	Class	No.
Haalck, Hans. What are the means of gravimetric determination that show through the presentation of local distribution the clearest picture of the differences of underground density causing the gravity anomaly? (in German)..	120	(1)	7791
______ Results of a complete calculation of the gravity anomaly in the region of Gifhorn (in German).........	121	(1)	7938
______ Rock magnetism (in German).......................	123	(2)	8206
Haarstick, F. The correlation method in reflection seismology (in German)................................	122	(3)	8095
Halet, R. A. Malartic mine was found by scientific exploration..	120	(2)	7807
Hallenbach, F. The permeability of porous rocks and its determination (in German)......................	122	(8)	8143
Hammer, Sigmund. Estimating ore masses in gravity prospecting..	121	(1)	7939

	Abs.	Class	No.
______ Gravimeter prospecting for chromite in Cuba (with Nettleton, L. L. and Hastings, W.K.)	121	(1)	7940
Hare, D. G. C. Method and apparatus for logging boreholes, U. S. Patent 2,369,672	122	(10)	8178
______ Method and apparatus for logging boreholes, U. S. Patent 2,370,162	122	(10)	8180
______ Borehole logging method and apparatus, U. S. Patent 2,374,197	123	(10)	8298
Harrison, E. P. A new method of measuring the inclination of the earth's magnetic field (with Smith, E. H.)	122	(2)	8072
Hartog, H. den. Measurements on self-quenching Geiger-Mueller counters, I - II (with Gemert, A. G. M. and Muller, F. A.)	121	(5)	7998
Hasbrock, A. F. Measuring instrument, U. S. Patent 2,357,822	121	(10)	8031
Hassler, G. L. Radiological exploration system, U. S. Patent 2,361,274 (with Cravath, A. M.)	121	(10)	8037
______ Analysis method for geochemical exploration, U. S. Patent 2,364,898	121	(10)	8048
Hastings, W. K. Gravimeter prospecting for chromite in Cuba (with Hammer, S. and Nettleton, L. L.)	121	(1)	7940
______ Gravimeter operations in the foothills belt of Alberta, Canada	123	(1)	8189
Hayes, H. C. Electrical prospecting, U. S. Patent 2,368,217	122	(10)	8171
______ Electrical prospecting, U. S. Patent 2,368,218	122	(10)	8172
Hayes, R. C. Earthquakes in New Zealand during the year 1943	120	(3)	7829
Heck, N. H. Japanese earthquakes	120	(3)	7830
______ The Jesuit contribution to seismology in the U. S. A.	121	(3)	7972
Heigl, J. J. Determining permeability of geologic structures, U. S. Patent 2,364,975 (with Hodell, L. R.)	121	(10)	8050
Heiland, C. A. Geophysics (Annual review 1944)	120	(8)	7883
______ Geophysical prospecting increased 30 percent in 1944	121	(8)	8014
Hemberger, S. J. Magnetic survey of the Florida peninsula (with Lee, F. W. and Swartz, J. H.)	122	(2)	8077
Henderson, H. I. Soil analysis for prospecting	121	(7)	8008
Henney, Keith. Prospecting for petroleum	120	(8)	7884
Heroy, W. B. America's future in oil	122	(8)	8144
Herzog, Gerhard. Well-logging, U. S. Patent 2,352,433	120	(10)	7912
Hirayama, M. On the diurnal variation of the earth's magnetic field	120	(2)	7808
______ Some problems on the earth magnetic and electric fields (in Japanese, with an English summary)	121	(2)	7952
Hodell, L. R. Determining the permeability of geologic structures, U. S. Patent 2,364,975 (with Heigl, J. J.)	121	(10)	8050

	Abs.	Class.	No.
Hodgson, E. A. Recent developments in rockburst research at Lake Shore mines	120	(3)	7831
______ Rockburst research at Lake Shore mines	122	(3)	8096
Homma, S. On Rayleigh and Stoneley waves	120	(3)	7832
Hood, R. L. Photoelectric recording system, U. S. Patent 2,376,311	123	(10)	8316
Hoover, Herbert Jr. Apparatus for recording seismic waves, U. S. Patent 2,374,204	123	(10)	8299
Horton, C. W. The analysis of oblique reflection data	122	(3)	8097
Horvitz, Leo. Chemical prospecting, U. S. Patent 2,370,793	122	(10)	8183
______ Geochemical well-logging, U. S. Patent 2,374,937	123	(10)	8302
______ Gas analysis, U. S. Patent 2,376,145	123	(10)	8312
Howe, H. H. Analysis of magnetometer-deflections	122	(2)	8073
______ Magnetic observatory results at Cheltenham, Md. for 1935-36 (with Knapp, D. G.)	123	(2)	8208
Howell, L. G. Gamma-ray well logging, U. S. Patent 2,358,574	120	(10)	7930
Hoylman, H. W. A study of the susceptibility of sediments (with Durbin, H. A.)	123	(2)	8207
Hubbard, Bela. Geochemical prospecting, U. S. Patent 2,377,082	123	(10)	8324
Hubby, L. M. Method of seismic prospecting, U. S. Patent 2,351,524 (with Lay, R. D. and Treybig, B. H., Jr.)	120	(10)	7909
Hugel, Helmut. Oriented cores (in German)	120	(8)	7885

I

	Abs.	Class.	No.
Illing, V. C. Geophysics applied to oil geology	120	(8)	7886
______ Role of stratigraphy in oil discovery	122	(8)	8145
______ Role of stratigraphy in oil discovery (digest)	123	(8)	8266
Imperial Oil Review. The search for oil in Saskatchewan	120	(8)	7887

J

	Abs.	Class.	No.
James, P. H. Leveling device for gravimeters, U. S. Patent 2,362,135	121	(10)	8040
______ Gravimeter null indicator, U. S. Patent 2,367,126	122	(10)	8168
Jeffreys, H. H. Types of isostatic adjustment	122	(1)	8060
Jezewski, M. A study of Geiger-Muller counters (in French, with Miesowicz, M.)	121	(5)	7999
Johnson, M. C. Well testing apparatus, U. S. Patent 2,363,793	121	(10)	8042
Johnson, M. E. Prospecting for iron ore in New Jersey in 1943	120	(2)	7809
Johnston, H. F. Mean K-indices from 27 magnetic observatories, 1943	120	(2)	7810
______ American magnetic character figure, July to September, 1944, also October to December, 1944 and summary for 1944	121	(2)	7953

	Abs.	Class	No.
______ American magnetic character figure, January to March, 1945	122	(2)	8074
Jones, A. E. Earthquake magnitudes, efficiency of stations, and perceptibility of local earthquakes in the Lake Mead area	120	(3)	7833
Jones, P. H. Ground-water exploration at Alexandria, Louisiana (with Maher, J. C.)	123	(4)	8248
Jones, P. J. Characteristics of electric logs (Part 8 of series)	121	(4)	7992
______ Application of electric-log data (Part 9 of series: Mechanics of producing oil, condensate, and natural gas)	121	(4)	7993
Jones, R. H. B. Geologic interpretation of magnetic exploration on the Mesabi Range, Minnesota	121	(2)	7954
Jones, W. M. The use of differences of arrival-times of Pas an aid to epicentral determinations in the South Pacific	121	(3)	7973
______ Table of Direction-Cosines to four figures at intervals of one degree in latitude and longitude over a zone of 60° of longitude and latitude from 0° to 40°	121	(3)	7974
______ Effects of focal depth on epicentral determinations from S-P intervals in the South Pacific region	122	(3)	8098
______ The application of P-difference methods of epicentral determination to New Zealand local seismology	123	(3)	8230
______ Determination of epicenters in the South Pacific from differences in the arrival-times of ScS	123	(3)	8231

K

	Abs.	Class	No.
Kalaschnikow, A. G. Regarding the possible reasons of magnetic anomalies in the region of Moscow (in Russian)	121	(2)	7955
______ Magnetic properties of sedimentary rocks (in Russian)	122	(2)	8075
Kanai, Kiyoshi. Model experiments for confirming the dissipation phenomena (scattering) in the seismic vibration of a structure	120	(3)	7834
Kawabata, J. Seismic or volcanic zone and the deflection of the vertical	120	(1)	7792
Kazinskii, V. A. The summation of the oscillations of two gravimetric pendulums on a ship (in Russian)	123	(1)	8190
Keller, Fred Jr. An electronic earthquake recorder	121	(3)	7975
Khramov, D. N. An experimental test of the hypothesis of partial isostatic compensation (in Russian)	123	(1)	8191
Kilchling, Karl. A dynamic elastic gravimeter (in German	123	(1)	8192
Kirillov, F. A. The influence of the depth of blasting on the seismic effects (in Russian)	120	(3)	7835

	Abs.	Class	No.
Klaus, H. Torsion balance step anomalies in northern Tillman County, Oklahoma	123	(1)	8193
Kline, Virginia. Oil and gas development in Illinois in 1944 (with Bell, A. H.)	123	(3)	8223
Knapp, D. G. Curiosities of magnetographs	122	(2)	8076
______ Magnetic observatory results at Cheltenham, Md., for 1935-36 (with Howe, H. H.)	123	(2)	8208
Kogbetliantz, E. G. Quantitative interpretation of magnetic and gravitational anomalies	120	(1,2)	7793
______ Quantitative interpretation of maps of magnetic and gravitational anomalies by mathematical methods	122	(1,2)	8061
Kohler, Reinhard. Measuring and counteracting the undesirable oscillations of the ground and buildings (in German)	121	(3)	7976
Kolin, Alexander. Mercury jet magnetometer	123	(2)	8209
Korytnikova, N. N. Regarding the relation of subsurface temperatures to the thermal coefficients of rocks and to the shape of subsurface structures (in Russian)	122	(6)	8129
Kothny, G. L. The application of oil well surveying instruments and technical services in the mining industry	121	(8)	8015
Kovach, E. M. An experimental study of the radon-content of soil gas	123	(5)	8256
Kovner, S. S. On the theory of thermal prospecting: Artinskian massif revealed on the slope of a gravitational maximum	123	(5)	8259
Kovrigina, V. I. A new determination of thermal coefficients of the pendulums of Apparatus No. 136608 of the Cambridge Society (in Russian, with Bulanzhe, Iu. D.)	121	(1)	7941
Kraskovsky, S. A. The apparatus for geothermal measurements in boreholes (in Russian)	120	(6)	7872
______ Geothermal measurements in coal districts (in Russian)	121	(6)	8007
______ Geothermal measurements in artesian boreholes (in Russian)	122	(6)	8130
______ Measurements of temperature in salt mines (in Russian)	123	(6)	8260
Krasnow, Shelley. Method and apparatus for dynamic measurement of borehole radioactivity, U. S. Patent 2,371,628	123	(10)	8286
Kreis, Alfred. Rock stress near the blast (in German)	123	(3)	8232
Kriegel, M. W. Analysis for hydrocarbons in the presence of nitrous oxide	120	(7)	7874
Krumbein, W. C. Sedimentary maps and oil exploration	122	(8)	8146
______ Recent sedimentation and the search for petroleum	123	(8)	8267
Krynine, P. D. The future of oil finding	120	(8)	7888
______ Sediments and the search for oil (1945)	123	(8)	8268

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L			
Lahee, F. H. Exploratory drilling in 1944	123	(8)	8269
Lambert, W. D. The international gravity formula	122	(1)	8062
Lawlor, R. D. Geochemical prospecting system, U. S. Patent 2,376,366 (with Metcalf, R. E.)	123	(10)	8317
Lay, R. L. Method of seismic prospecting, U. S. Patent 2,351,524 (with Treybig, B. H. Jr. Eabby, L. M.)	120	(10)	7909
______ Repeated P-waves in seismic exploration of water covered areas	123	(3)	8233
Lee, F. W. Magnetic survey of the Florida peninsula (with Swartz, J. H. and Hamberger, S. J.)	122	(2)	8077
Lees, G. M. "Anglo-Iranian" oil search in Great Britain reviewed (with Taitt, A. H.)	122	(3)	8099
Leet, L. D. The Mexican earthquakes of April 15, 1941 and February 22, 1943 (with Collins, M. P.)	121	(3)	7967
Lehnhard, P. J. Jr. Method of determining the permeability of earth formations, U. S. Patent 2,376,878	123	(10)	8322
Levorsen, A. I. The search for new oil provinces	121	(8)	8017
Levings, W. S. Aerogeology in mineral exploration	121	(8)	8016
Lewis, W. B. Working depths for low frequency electrical prospecting	121	(4)	7994
Lomaev, G. Z. The augmentation-coefficient of the inclination gauge equipped with Zolner's weight (in Russian)	122	(1)	8063
Lundberg, H. I. F. Tracing the course of a flat ange diamond drill hole by electric equipotential lines	122	(4)	8115
Lustikh, E. N. On the use of gravitational survey data of reconnoitering nature	123	(1)	8194
Lynch, W. A. Characteristics of Alaskan earthquake records at distances of 40° to 70° (with Dillon, V.)	122	(3)	8100
Lynton, E. D. Method of well core investigation, U. S. Patent 2,359,135	120	(10)	7932
M			
Macdonald, G. A. The 1942 eruption of Mauna Loa, Hawaii.	120	(3)	7836
Macelwane, J. B. Progress report of the Jesuit Seismological Association for the years 1941, 1942, and 1943	122	(3)	8101
Maeder, H. A. Gravity meter, U. S. Patent 2,355,421 (with Clewell, D. L.)	120	(10)	7923
Magnee, I. de. Magnetic study of Cambrian techtonics in Brabant to the east of Court St. Etienne (in French, with Raynaud, J.)	123	(2)	8210
______ Recent advances of geophysical exploration and possibilities of application in the Belgian Congo (in French)	123	(8)	8270
Maher, J. C. Ground-water exploration at Alexandria, Louisiana (with Jones, P. H.)	123	(4)	8248

	Abs.	Class	No.
Maree, B. D. Notes on some magnetometric surveys with special reference to anomalies on Karroo dolerites..	123	(2)	8211
Marsch, B. The technique of electrical measurements in the geophysical exploration of the ground (in German)...	120	(4)	7854
Marsden, E. Radioactivity of New Zealand soils and rocks (with Watson-Munro, C.)......................	121	(5)	8000
Mathematical Tables Project, W.P.A., U. S. A. Tables of Lagrangian interpolation coefficients...............	120	(9)	7905
Maurain, Charles. On magnetic disturbances in the form of bays (in French, with Coulomb, J.)...............	120	(2)	7811
Maxwell, C. T. Radioactivity economics..................	121	(5)	8001
McCampbell, J. C. A geomagnetic survey of some Bladen county, North Carolina, "Carolina Bays"..	123	(2)	8212
McComb, H. E. A general purpose vibration meter (with Neumann, F.).......................................	122	(3)	8103
______ The seismological installation at the South Dakota State School of Mines and Technology, Rapid, City, South Dakota (with Gebhardt, R. E. and Wark, D.)...	123	(3)	8234
McCusker, C. B. A. A new type of counter for ionizing particles...	122	(5)	8122
McDermott, Eugene. Method of prospecting for buried deposits, U. S. Patent 2,367,592..................	122	(10)	8169
______ Method of prospecting for buried deposits, U. S. Patent 2,371,637..	123	(10)	8287
______ Seismic detector system, U. S. Patent 2,375,570..	123	(10)	8305
McGuckin, G. M. History of the geophysical exploration of the Cameron Meadows Dome, Cameron Parish, Louisiana...	121	(1)	7942
McNish, A. G. Changes in the solar-diurnal variations in vertical magnetic intensity at the Huancayo Magnetic Observatory, 1922-1943............................	123	(2)	8213
McTee, A. R. The war's influence on geophysics..........	123	(8)	8271
Mercier, V. J. Radioactivity well logging in Kansas.....	122	(5)	8123
Merten, Eugen. Seismic exploration method, U. S. Patent 2,353,484 (with Woods, J. P.)........................	120	(10)	7917
Metcalf, H. E. Geochemical prospecting system, U. S. Patent 2,374,227..	123	(10)	8300
______ Geochemical prospecting system, U. S. Patent 2,376,366 (with Lawlor, R. C.)......................	123	(10)	8317
Miesowicz, M. A study of Geiger-Muller counters (in French, with Jezewski, M.)............................	121	(5)	7999
Mikov, D. S. On a special nomogram for the interpretation of magnetic anomalies (in Russian)...............	122	(2)	8078
Milatz, J. M. W. Quantitativity of Geiger counters for B-rays (with Velden, H. A.)..........................	121	(5)	8002
Miller, F. Stuart. Graphs for obtaining true thickness of a vein or bed.......................................	121	(8)	8018

	Abs.	Class	No.
Miller, R. B. Electrical exploration apparatus, U. S. Patent 2,363,987	121	(10)	8047
Millikan, C. V. Oil well testing device, U. S. Patent 2,374,557	123	(10)	8301
Millington, J. W. Electrical prospecting method and apparatus, U. S. Patent 2,376,610	123	(10)	8318
Mining Journal, London. Oil in Great Britain	123	(3)	8235
Minton, J. P. Contractor-expander for electric seismographs, U. S. Patent 2,354,420	120	(10)	7919
______ Apparatus for recording seismic waves, U. S. Patent 2,360,507	121	(10)	8035
______ Geophysical prospecting apparatus, U. S. Patent 2,371,973	123	(10)	8289
______ Seismograph, U. S. Patent 2,375,433	123	(10)	8304
Modriniak, N. A preliminary geophysical survey of part of the Whakatane District (New Zealand)	123	(2,3)	8214
Montana Oil and Mining Journal. Wyoming has 57 geophysical crews working in oil areas	123	(8)	8272
Morgan, Joseph. Experiments on and theory of the action of the Geiger-Point Counter (with Bohn, J. L.)	120	(5)	7864
Mounce, W. D. Automatic gain adjusting device for reflection seismographs, U. S. Patent 2,366,043	122	(10)	8164
______ Well logging, U. S. Patent 2,376,168	123	(10)	8313
Muchemble, Georgette. Concerning the high radio-activity of the sea rocks of the coal strata in the north of France (in French)	122	(5)	8124
Muffly, Gary. Electrical prospecting, U. S. Patent 2,354,535	120	(10)	7920
______ Apparatus for electrical bore logging, U. S. Patent 2,364,159	121	(10)	8044
______ Amplifier (seismic), U. S. Patent 2,370,483	122	(10)	8181
Mullane, J. J. Well logging, U. S. Patent 2,368,486	122	(10)	8173
Muller, F. A. Measurements on self-quenching Geiger Muller counters, I - II, (with Gemert, A. G. M. and Hartog, H.)	121	(5)	7998
Muller, Max. Measurement of the dependence of frequency on the electrical conductivity and dielectrical constant of rock samples (in German)	120	(4)	7855
Muskat, Morris. The interpretation of earth-resistivity measurements	120	(4)	7856
Muzzey, D. S. Vibration detector, U. S. Patent 2,353,920	121	(10)	8029
______ Electrical exploration apparatus, U. S. Patent 2,363,987	121	(10)	8043

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	Abs.	Class	No.
National Petroleum News, Cleveland. Truman claims continental shelf oil for United States	123	(8)	8273

	Abs.	Class	No.
National Research Council, U. S. A. American Geophysical Union, Transactions of 1944	122	(9)	8157
Nature, London. Geophysical exploration in Canada and the U. S. A.	120	(8)	7889
______ The "Microtimer"	122	(3)	8102
Nawijn, A. The mechanism of the Geiger-Muller counter...	122	(5)	8125
Nettleton, L. L. Gravimeter prospecting for chromite in Cuba (with Hammer, S. and Hastings, W. K.)	121	(1)	7940
______ Relation of magnetic and density contrasts to igneous-rock classifications (with Elkins, T. A.)...	123	(1)	8195
Neufeld, Jacob. Well logging instrument, U. S. Patent 2,376,821 (with Scherbatskoy, Fearon, and Swift)....	123	(10)	8321
Neumann, Frank. Period-amplitude analysis of strong motion records	121	(3)	7977
______ A general purpose vibration meter (with McComb, H. E.)	122	(3)	8103
Neumann, Gerhard. Regional torsion-balance measurements on the Gulf Coast of Texas (in German)	122	(1)	8064
Northern Miner, Toronto. How to claim allowances for geophysical work	120	(8)	7890
______ Seven years geophysical work in Ontario reviewed.	120	(8)	7891
Novitskaia, A. P. The radioactivity of the Sungul peat muds (in Russian, with Baranov, V. I.)	123	(5)	8251
Noya, R. M. The application of geophysics to water supply problems	122	(4)	8116

O

	Abs.	Class	No.
Oaks, H. A. Functions of the aeroplane in Canadian prospecting	122	(8)	8147
Obert, Leonard. Microseismic method of predicting rock failure in underground mining. Part I: General method (with Duvall, W.)	121	(3)	7978
______ Microseismic method of predicting rock failure in underground mining. Part II: Laboratory experiments (with Duvall, W.)	123	(3)	8236
Observatory, London. The great magnetic storm of 1941, March 1	121	(2)	7956
Ogg, A. The determination of the horizontal component of the earth's magnetic force at the Magnetic Observatory, Hermanus, Un. So. Afrrica (with Gotsman, B. and Wijk, A. M.)	122	(2)	8079
______ The comparison of horizontal-intensity magnetometers	123	(2)	8215
Ogurskii, A. F. Investigation of the influence of electrified railways on the earth's magnetic field (in Russian)	122	(2)	8080

	Abs.	Class	No.
Oil and Gas Journal. Start exploration work on Union Oil Company's Paraguay concession	120	(3)	7837
______ England's only oil field is most strategically located Allied supply	120	(8)	7892
______ Expansion of foreign exploration calls for more geophysical activity, S. E. G. is told	121	(8)	8019
______ Patents issued on new electrical method for oil prospecting (U. S. Patents 2,368,217 and 2,368,218.	122	(4)	8117
Oil News, Albuquerque, N. M. Three geophysical survey crews busy in San Jaun Basin	123	(8)	8274
Oil Weekly, Houston, Texas. Geophysical reconnaissance work under way in Oklahona	123	(1,3)	8196
Ol, A. J. Solar activity and geomagnetic perturbations. (in Russian)	120	(2)	7812
Olken, Hyman. Method and apparatus for moisture measurement of materials, U. S. Patent 2,373,846	123	(10)	8296
Olson, R. W. Apparatus for transmitting seismic signals, U. S. Patent 2,369,081 (with Shook, E. M.)	122	(10)	8175
______ Apparatus for seismic surveying, U. S. Patent 2,369,082 (with Shook, E. M.)	122	(10)	8176
Ospina, R. E. Colombia entering new era of widespread exploration	120	(8)	7893
Ostrovskii, A. E. On seismic logging	121	(3)	7979
Otis, R. M. Method of and apparatus for Firing Gun Perforators, U. S. Patent 2,356,082	120	(10)	7925

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	Abs.	Class	No.
Parker, B. H. The migration and accumulation of petroleum and natural gas (with Van Tuyl, F. M. and Skeeters, W. W.)	122	(9)	8158
Parr, J. O. Jr. Seismic Surveying, U. S. Patent 2,352,494	120	(10)	7913
______ Seismic surveying, U. S. Patent 2,354,659 (with Bazhaw, W. O.)	120	(10)	7922
Patton, J. L. Measurement of the rate of soil gas evolution, U. S. Patent 2,366,351	122	(10)	8165
Pendse, C. G. On the theory of seismometers	122	(3)	8104
Peters, J. W. Gravity and magnetic investigations at the Grand Saline Salt Dome, Van Zandt Co., Texas (with Dugan, A.)	123	(1,2)	8197
Petrenko, E. E. A net of coordinates for determining the epicenter of an earthquake (in Russian)	120	(3)	7838
Petrescu, G. Determination of the epicenter of the earthquake of October 22, 1940 in Roumania (in French)	122	(3)	8105
Petroleum, London. The British oil field	121	(8)	8020
Petroleum Engineer, Dallas. English oil field	120	(3)	7839

	Abs.	Class	No.
Petroleum Times, London. Anglo-American Oil Company's part in British oil search	123	(8)	8275
Petroleum World, Los Angeles. Fluorescence in oil exploration	123	(8)	8276
Petty, O. S. Measuring instrument and method, U. S. Patent 2,357,356	121	(10)	8030
______ Seismic surveying, U. S. Patent 2,361,648	121	(10)	8039
______ Seismic surveying, U. S. Patent 2,365,289	121	(10)	8051
______ Automatic volume control for recorder amplifiers, U. S. Patent 2,367,049	122	(10)	8167
Peyton, Garland. Prospecting for oil in Georgia	122	(8)	8148
Pirson, S. J. Genetic and morphologic classification of reservoirs	122	(8)	8149
Poisson, Yvon. Geophysical tests for the measurement of properties of soils and grounds (in French)	122	(8)	8150
Pontecorvo, Bruno. Geophysical prospecting, U. S. Patent 2,353,619 (with Swift, G.)	120	(10)	7918
Popescu, I. G. A comparative study of some earthquakes in Roumania, of the type of that of November 10, 1940 (in French)	121	(3)	7980
Pratley, H. H. Geophysical exploration, U. S. Patent 2,364,655	121	(10)	8046
Prey, A. Remarks regarding Prey's reduction of gravity measurements (in German)	120	(1)	7794
Procopiu, S. Magnetic measurements in Rumania in 1938: Magnetic declination and the horizontal component	120	(2)	7813
Pushkow, N. W. Geophysical work in the Union of Soviet Socialist Republics	120	(2)	7814

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	Abs.	Class	No.
Rajewsky, B. The Geiger-Muller counter in the service of mining (in German)	120	(5)	7865
Rama Rao, B. Annual report for the year 1941-42	123	(4)	8249
Ramachandra Rao, M. B. Notes on the underground prospecting work carried out for testing the geophysical indication at Guddadarangavvanahalli, Chitaldrug district (Mysore)	120	(4)	7857
Ranney, Leo. Surveying instrument, U. S. Patent 2,373,976	123	(10)	8295
Raymond, E. F. Retrievable gun perforator, U. S. Patent 2,356,431	120	(10)	7926
Raynaud, J. Magnetic study of Cambrian techtonics in Brabant to the east of Court St. Etienne (in French, with Magnee, I. de)	123	(2)	8210
Razdymakha, G. S. An experimental model of a gravimeter with minimal quartz pendulums constructed by the Ts. NIIGAIK (in Russian)	120	(1)	7795

	Abs.	Class	No.
Reich, H. Pocketbook of applied geophysics (in German, with Zwerger, R.)........	120	(9)	7906
Ribner, H. S. Well Logging method and apparatus, U. S. Patent 2,359,894 (with Brown, H.)........	121	(10)	8033
Rice, A. H. Air photography in geographical exploration and in topographical and geological surveying......	122	(8)	8151
Rich, J. L. Oil possibilities of South America in the light of regional geology........	121	(8)	8021
Richter, C. F. Frequency of earthquakes in California (with Gutenberg, B.)........	120	(3)	7827
______ Recent results of earthquake study in Southern California (with Gutenberg, B.)........	120	(3)	7828
______ Seismicity of the earth (Supplementary paper) (with Gutenberg, B.)........	123	(3)	8229
Ricker, N. H. Wavelet functions and their polinomials..	120	(3)	7840
______ Seismic prospecting, U. S. Patent 2,351,456.....	120	(10)	7908
______ Seismic prospecting, U. S. Patent 2,354,548......	120	(10)	7921
______ The computation of output disturbances from amplifiers for true wavelet inputs........	122	(3)	8106
Rieber, Frank. System for geological exploration by elastic waves, U. S. Patent 2,377,903..............	123	(10)	8326
Riggs, A. S. Dynamic earth inductor compass, U. S. (with Thompson, H. H.) Patent 2,376,883..........	123	(10)	8323
Riise, J. A. Jr. Method of well logging, U. S. Patent 2,370,814........	122	(10)	8184
Rinehart Oil News Co. of Oklahoma. Rinehart's Yearbook 1945........	121	(9)	8026
Ritzmann, O. F. Electrical displacement vibrometer, U. S. Patent 2,359,245........	121	(10)	8032
______ Apparatus for seismograph prospecting, U. S. Patent 2,364,755........	121	(10)	8047
Riznichenko, G. V. On reciprocal points in the seismic method of reflections (in Russian)................	123	(3)	8237
Roberts, John. Rock disturbance in relation to economics and world policy........	123	(8)	8277
Robertson, Florence. A mathematical analysis of numerical integration of electromagnetic seismograms.....	122	(3)	8107
Robinson, W. B. Refraction waves reflected from a fault zone........	123	(3)	8238
Robles Ramos, Ramiro. The volcano Paricutin and Mexican neo-volcanism (in Spanish)........	120	(3)	7841
Roever, W. M. The weight field of force of the earth...	120	(1)	7796
Rohr, K. Oriented hand coring in geological field work.	120	(8)	7894
Romanovsky, Vsevolod. Concerning an apparatus for the determination of the thermal conductivity of soils (in French)........	122	(6)	8131
Rona, Elizabeth. Radioactivity of the ocean...........	120	(5)	7866
Rooney, W. J. Diurnal-variation anomalies at Tucson....	123	(2)	8216

	Abs.	Class	No
Roper, E. E. Geochemical surveying, U. S. Patent 2,374,135	123	(10)	829
Rose, T. N. Secular changes of the earth's residual magnetic field (in Russian)	123	(2)	821
Rossiger, M. The disturbances produced in magnetic observation spheres and observatories of terrestiral magnetism by the D. C. magnetic fields of electric railroads (in German)	121	(2)	795
Rougerie, Paul. On the direction of terrestrial magnetization (in French)	120	(2)	781
Ruedemann, Rudolf. The Hudson valley belt of graptolite shales and negative anomalies of gravity	120	(1)	779
Ruedy, R. The use of cumulative resistance in earth-resistivity surveys	122	(4)	811
Russell, W. L. Relation of radioactivity, organic content, and sedimentation	123	(5)	825
Rust, W. M. Jr. How to judge geophysical methods	121	(8)	802
______ Evaluation of new geophysical methods. (Condensed version)	122	(8)	815
______ Evaluation of new geophysical methods	123	(8)	827

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	Abs.	Class	No
Sadovsky, M. A. Determination of seismic danger zones of blasting (in Russian)	120	(3)	784
Salvatori, Henry. Early reflection seismograph exploration in California	121	(3)	798
Samsonov, N. A textbook of gravitational surveying (in Russian)	122	(1)	805
Sanchez, Pedro. Some volcanological and seismological conclusions regarding Mexico and Central America	123	(3)	823
Sanderson, R. T. Geochemical prospecting, U. S. Patent 2,375,949	123	(10)	831
Savarenskii, E. F. Seismic waves reflected from a boundary at the depth of 900 kilometers (in Russian)	121	(3)	798
Sawdon, W. A. The oil industry in Mexico	120	(3)	784
______ Colombia is active both in development and exploration	120	(8)	789
______ Geophysical work in Paraguay indicates extent of exploration in South America	121	(3)	798
Schenk, Erwin. Concerning the localization of steep geological boundary surfaces in the subsoil by means of D. C. current measurements (in German)	123	(4)	825
Scherbatskoy, S. A. Amplifying apparatus, U. S. Patent 2,376,195	123	(10)	831
______ Ionization chamber, U. S. Patent 2,376,196	123	(10)	831
______ Well logging instrument, U. S. Patent 2,376,821 (with Fearon, Neufeld, and Swift)	123	(10)	83

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Schleusener, Alfred. A few critical remarks on the significance of the vertical gradient for exploration geophysics (in German)	123	(1)	8198
Schlumberger, Marcel. Depth measuring apparatus, U. S. Patent 2,361,064	121	(10)	8036
Schwinner, Robert. What can the residual magnetization of borehole cores mean? (in German)	120	(2)	7816
Science, Lancaster, Pa. The Institute of Geophysical Technology at St. Louis University	120	(8)	7896
Scott, W. E. List of geomagnetic observatories and thesaurus of values, VI-VII (with Fleming, J. A.)	120	(2)	7805
Seismograph Service Corporation. Gulf, Mexican and Caribbean oil zones. South American oil zones	120	(3)	7844
Sen Chowdhury, P. K. Radium content of Ceylon thorianite	120	(5)	7867
Sharpe, J. A. Seismic prospecting, U. S. Patent 2,355,826	120	(10)	7924
Shaw, Herman. Report on preliminary visit to Inyaminga, 1936; and other papers	120	(8)	7897
Shchepot'eva, E. S. The radioactivity of the waters and rocks of Zheleznovodsk (in Russian)	122	(5)	8126
Shepherd, G. F. Geologic use of drilling-time data (with Atwater, G. I.)	120	(8)	7898
Shimek, E. J. Master control for electric seismographs, U. S. Reissue Patent 22,535	121	(10)	8028
Shneiderov, A. J. Earthquakes on the expanding earth	123	(3)	8240
Shook, E. M. Apparatus for transmitting seismic signals, U. S. Patent 2,369,081 (with Olson, R. W.)	122	(10)	8175
______ Apparatus for seismic surveying, U. S. Patent 2,369,082 (with Olson, R. W.)	122	(10)	8176
Short, E. H. Jr. Directional drilling used as exploratory tool in Gulf Coast well	123	(8)	8279
Silverman, Daniel. Radioactivity logging, U. S. Patent 2,362,164	121	(10)	8041
______ Apparatus for drilling-rate logging, U. S. Patent 2,365,014 (with Stuart, R. W.)	122	(10)	8163
Simpson, J. A. Jr. Reduction of the natural insensitive time of G-M counters	120	(5)	7868
Sineritz, J. G. Gravimetric station at the Geological and Mining Institute of Spain operates with an Askania gravimeter (in Spanish)	123	(1)	8199
Singewald, J. T. Jr. The oil and gas play in Maryland	121	(8)	8023
Skeeters, W. W. The migration and accumulation of petroleum and natural gas (with Van Tuyl, F. M. and Parker, B. H.)	122	(9)	8158
Skillings Mining Review, Duluth, Minn. Magnetic surveys for iron ore in New Jersey	121	(2)	7958
______ Submarines useful in oil exploration	123	(1)	8200
______ Complete magnetic survey for Florida oil	123	(2)	8218

	Abs.	Class	No.
Smith, A. L. Electrical logging of well bores, U. S. Patent 2,371,270	122	(10)	8185
Smith, E. H. A new method of measuring the inclination of the earth's magnetic field (with Harrison, E. P.)	122	(2)	8072
Snyder, E. J. The geographic incidence of aurora and magnetic disturbances, southern hemisphere (with Vestine, E. H.)	123	(2)	8221
Solaini, L. Gravity determinations along a topographic survey line of great precision between Genoa and Isola de Cantone (in Italian)	121	(1)	7943
South African Mining and Engineering Journal. The search for Free State gold	122	(1)	8065
Souther, Robert E. Application of mud analysis logging	121	(7)	8008
Spiroff, Kiril. Dip-needle survey of Wyandotte-Winona area, Houghton County, and Cherokee area, Ontonagon County	120	(2)	7817
Starik, I. E. Earth's age by radioactive data	120	(5)	7869
Steenland, N. C. Report on magnetic survey and seismological observations made in the vicinity of Paricutin volcano, State of Michoacan, Mexico, May-July, 1943 (with Bodle, R. R.)	121	(2)	7949
Steinhoff, J. R. Apparatus for sonic detection, U. S. Patent 2,376,730	123	(10)	8320
Stephenson, E. L. Magnetometer surveys on black sands of the Oregon coast	123	(2)	8219
Stetson, H. C. Oceanography; report of the Smithsonian Institution, 1943	120	(8)	7899
Stewart, W. H. Method and apparatus for determining current flow in borehole casing or the like, U. S. Patent 2,371,658	123	(10)	8288
Strautyn, E. F. The question of average velocities in the interpretation of seismic observations in Western Siberia (in Russian)	121	(3)	7984
Stuart, R. W. Apparatus for drilling-rate logging, U. S. Patent 2,365,014 (with Silverman, D. J.)	122	(10)	8163
______ Drill mud logging recording system or the like, U. S. Patent 2,369,811	122	(10)	8179
Stulken, E. J. Effect of ray curvature upon seismic interpretation	123	(3)	8241
Swainson, O. W. Magnetic work of the United States Coast and Geodetic Survey from April 1943 through March 1944	122	(2)	8081
Swartz, J. H. Magnetic survey of the Florida peninsula (with Lee, F. W. and Hemberger, S. J.)	122	(2)	8077
Swift, Gilbert. Geophysical prospecting, U. S. Patent 2,353,619 (with Pontecorvo, B.)	120	(10)	7918
______ Well logging instrument, U. S. Patent 2,376,821 (with Scherbatskoy, Fearon, and Neufeld)	123	(10)	8321
Sziklai, G. C. Signal recording and reproducing method, U. S. Patent 2,373,273	123	(10)	8294

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	Abs.	Class	No.
Taitt, A. H. "Anglo-Iranian" oil search in Great Britain reviewed (with Lees, G. M.)	122	(3)	8099
Tamm, I. E. (Electric) Currents in the ionosphere producing variations in the earth's magnetic field (in Russian)	122	(2)	8082
Tamura, M. On the newly designed driving mechanism of free pendulum	121	(1)	7944
Taylor, D. D. Analytical system, U. S. Patent 2,373,151	123	(10)	8292
Taylor, J. H. On the determination of magnetic vertical intensity, Z, by means of surface integrals	121	(2)	7959
Technical News Bulletin of the National Bureau of Standards. Thin-Walled aluminum Geiger-Muller counters	122	(5)	8127
Teichmann, C. F. Method of determining the porosity and location of permeable formations in oil wells, U. S. Patent 2,358,945	120	(10)	7931
Ter Braake, A. L. Mining in the Netherlands East Indies	122	(8)	8153
Terrestrial Magnetism and Atmospheric Electricity. Note: Geiger tube	120	(5)	7870
Thellier, Emile. Geomagnetic research on lava flows in Auvergne (in French, with Thellier, O.)	123	(2)	8220
Thellier, O. Geomagnetic research on lava flows in Auvergne (in French, with Thellier, E.)	123	(2)	8220
Theodorovich, G. I. Sulphur in the Buguruslan oil region.	120	(7)	7875
Thompson, H. H. Dynamic earth inductor compass, U. S. Patent 2,376,883 (with Riggs, A. S.)	123	(10)	8323
Thyer, R. F. Report on the geophysical surveys at the Wallaroo-Moonta copper field	120	(2)	7819
Thyssen, S. von. Concerning the possible influence of ground-water shifts on the torsion balance (in German)	120	(1)	7798
Tikhonov, A. N. The influence of an intermediate layer in vertical electrical sounding (in Russian, with Turkisher, R. I.)	120	(4)	7858
Tiratsoo, E. N. The influence of structure on the accumulation of oil	122	(8)	8154
______ Future trends in oil finding	123	(8)	8280
Todd, J. D. Mississippi where persistence pays	123	(8)	8281
Tolk, John F. Seismic surveying, U. S. Patent 2,352,869	120	(10)	7915
Tovchigrechko, S. S. The calculation of the isostatic reduction of gravity for gravimetric stations in the Crimea and the Black Sea (in Russian)	121	(1)	7945
Treybig, B. H. Jr. Method of seismic prospecting, U. S. Patent 2,351,524 (with Lay, R. L. Habby, L. M.)	120	(10)	7909
Tripp, R. M. Thermodynamics of a gas migrating vertically through the sedimentary column	122	(7)	8132
______ Measurements of soil-air ions over the Fort Collins anticline	122	(7)	8133

	Abs.	Class	No
Turechek, G. F. More about powder and ballistics	120	(8)	790
______ Gun perforator, U. S. Patent 2,360,024	121	(10)	803
Turkisher, R. I. The influence of an intermediate layer in vertical electrical sounding (in Russian, with Tikhonov, A. N.)	120	(4)	785
______ Regarding a problem of vertical electrical sounding (in Russian)	121	(4)	799

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	Abs.	Class	No
Ulrich, F. P. Progress report of seismological work by the United States Coast and Geodetic Survey in the Western United States during 1943	120	(3)	784
______ A cooperative seismological program with South and Central America	122	(3)	810

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	Abs.	Class	No
Vacquier, Victor. The Gulf absolute magnetometer	122	(2)	808
Van Tuyl, F. M. Review of petroleum geology in 1944	121	(9)	802
______ Geochemistry and geobiology (1944)	122	(7)	813
______ Developments in geophysics (1944)	122	(8)	815
______ The migration and accumulation of petroleum and natural gas (with Parker, B. H. and Skeeters, W. W.)	122	(9)	815
Velden, H. A. v. d. Quantitativity of Geiger counters for B-rays (with Milatz, J. M. W.)	121	(5)	800
______ On some fluctuation problems connected with the counting of impulses produced by a Geiger-Muller counter or ionisation chamber (with Endt, P. M.)	123	(5)	825
Vening-Meinesz, F. A. Gravimetrical observations at sea: Theory and practice (in Russian)	120	(1)	779
______ The earth's crust under the ocean	121	(1)	794
Vernadsky, V. I. Radiogeology and its significance for the geology of today (in Russian)	121	(5)	800
Vesanen, Eijo. Concerning the evaluation of seismograms by type analysis (in German)	121	(3)	798
Vestine, E. H. Analysis and interpretation of geomagnetic anomalies (with Davids, N.)	121	(2)	796
______ The geographic incidence of aurora and magnetic disturbance, southern hemisphere (with Snyder, E. J.)	123	(2)	822
Voitesti, I. P. Geological considerations regarding the epicentral region of the earthquake of November 10, 1940 in Roumania (in French)	122	(3)	810

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	Abs.	Class	No
Wallace, W. E. Jr. Structure of south Louisiana deep-seated domes	120	(4)	785
Walter, E. J. An extension of the method of numerical integration of seismograms to include a third integration	122	(3)	811

	Abs.	Class	No.
______ An extension of the method of numerical integration of seismograms to include a third integration: full text	123	(3)	8242
Wark, David. The seismological installation at the South Dakota State School of Mines and Technology, Rapid City, S. D. (with McComb, H. E. and Gebhardt, R. E.)	123	(3)	8234
Wasserfall, K. F. Harmonic analysis of the annual variation of magnetic declination and horizontal intensity at Oslo, 1843-1930	121	(2)	7961
Watson-Munro, C. N. Radioactivity of New Zealand soils and rocks (with Marsden, E.)	121	(5)	8000
Weatherby, B. B. Early seismic discoveries in Oklahoma.	123	(3)	8243
Weaver, C. E. Geology of Oregon and Washington and its relation to occurrence of oil and gas	123	(8)	8282
Weiss, Oscar. Report on the geophysical survey at Inhaminga	120	(1)	7800
Weller, J. M. Petroleum possibilities of Red basin of Szechuan province, China	120	(3)	7901
West, S. S. The relative abundance of the carbon isotopes in petroleum	123	(7)	8261
Whitcroft, T. H. Future activities in deep-sea surveying	123	(8)	8283
White, G. V. Geology of the Odendaalsrust gold field (with Borchers, R.)	122	(8)	8135
Wichmann, H. Pre-discharge fields and duration of field changes due to lightning	120	(4)	7860
______ Field changes of lightning discharges between clouds and to earth	120	(4)	7861
______ Sign and field strength of field changes due to lightning	122	(4)	8119
Wickman, F. E. On the emanating power and the measurement of geological time	121	(5)	8004
______ Can the "lead method" be used on igneous rocks?	122	(5)	8128
Wijk, A. M. von. The determination of the horizontal component of the earth's magnetic force at the Magnetic Observatory, Hermanus, Un. So. Africa (with Ogg, A. and Gotsman, B.)	122	(2)	8079
Williams, H. J. Effects of small stresses on magnetic properties (with Bozorth, R. M.)	123	(2)	8204
Williams, Neil. Mud-analysis logging	120	(7)	7876
Wilson, H. D. B. Geochemical studies of the epithermal deposits at Goldfield, Nevada	123	(7)	8262
Winter, A. B. A new application for the neutron log	121	(5)	8005
Wolf, Alfred. Motion of a rigid sphere in an acoustic wave field	121	(3)	7986
Wood, H. O. A note on the Charleston earthquake	122	(3)	8111
Woods, J. P. Seismic exploration method, U. S. Patent 2,353,484 (with Merten, E.)	120	(10)	7917

	Abs.	Class	No
Woollard, G. P. Gravity observations in northern New England	121	(1)	794
Y			
Yacimientos Petroliferos Fiscales (Argentina). Memoria correspondiente al ano 1942	120	(8)	790
______ Memoria de Y.P.F. correspondante al ano 1943	121	(8)	802
Z			
Zaborovsky, A. I. Electrical exploration (in Russian)	122	(4)	812
Zaikowsky, W. M. System for gas analysis, U. S. Patent 2,370,703	122	(10)	818
Zakashanskii, M. S. A textbook of gravitational surveying (in Russian)	122	(1)	805
Zanetta, A. J. Research and the petroleum industry (in Spanish)	121	(8)	802
______ Research and the petroleum industry (Abridged version) (in Spanish)	123	(8)	828
Zapffe, Carl. Memorandum report on iron ores of the Cle Elum district, Washington	120	(2)	782
Zapolskii, K. K. Results of certain investigations of the seismographs for registration of reflected waves (in Russian)	120	(3)	7844
Zirbel, N. N. A method of determining dip, strike, and impact point for steeply dipping beds	123	(8)	828
ZoBell, C. E. Transformation of organic material into petroleum-bacteriological and sedimentation phases	121	(7)	801
Zwerger, Rudolf, von. The evaluation of the geological and technical possibilities for finding oil by radioactive investigations in boreholes (in German)	120	(5)	787
______ Pocketbook of applied geophysics (in German, with Reich, H.)	120	(9)	790

Corrigendum: In the Annual Index, 1944, p. 56, the entry under Coulomb, Jean, should be: The principal part of the total terrestrial magnetic field and the local vertical component (in French)	119	(2)	7660